

PHYSIOLOGY AND PSYCHIATRY¹R. W. GERARD, M. D.,² CHICAGO, ILL.

INTRODUCTION

The title I preferred for this lecture was, "The Head Is Not Hollow." The dignity of the occasion, however, and the possible implication of scolding psychiatry, rather than of confessing the limitations of physiology, deterred me.

The present situation is not too different from that I described a few years ago:

It remains sadly true that most of our present understanding of mind would remain as valid and useful if, for all we knew, the cranium were stuffed with cotton wadding. In time, the detailed correlation of psychic phenomena and neural processes will surely come; but today we are hardly beyond the stage of unequivocal evidence that the correlation does exist. The neuro-anatomist and physiologist are still crudely deciphering the architecture and operation of the organ of mind; the psychologist and psychiatrist are concerned with nuances in the overtones it plays (1, p. 487).

Moreover, so great a thinker in the neurological realm as Sir Charles Sherrington could see, a decade back, no signs of rapprochement between the material and mental:

No attributes of "energy" seem findable in the processes of mind. That absence hampers explanation of the tie between cerebral and mental. Where the brain correlates with mind, no microscopical, no physical, no chemical means detect any radical differences between it and other nerve which does not correlate with mind. In both regions, whether "mental brain" and (or) "non-mental brain," changing electrical potentials along with thermal and chemical actions make a physiological entity held together by energy-relations. To correlate with that physiological entity, a suite of mental experience, a complex of thought, feeling, conation, an activity no doubt, but with what if any relation to electrical potential, heat and chemistry. For myself, what little I know of the how of the one does not, speaking personally, even begin to help me toward the how of the other. The two for all I can do remain refractorily apart. They seem to me disparate; not mutually convertible; untranslatable the one into the other (2, p. 312).

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² Department of Physiology, University of Chicago.

The problem concerns us here at the human level and, in man, "a few extra ounces of nerve cells and connections in the cortex have permitted symbolism in language and number and abstract reasoning to a degree so beyond that of other animals that something almost qualitatively new has been added" (3, p. 103). Yet these added neurones appear to be of the same sort as, and with similar connections to, those elsewhere in the human nervous system or, for that matter, in nervous systems all up and down the phylogenetic tree. And most workers in these fields are convinced that somehow the properties of the single neurone and of its junctions with others carry in them the full seed which effloresces in the psychic behavior of man. This was impressively exemplified at the recent Hixon Symposium on Brain Mechanisms and Behavior, where leading psychologists, psychiatrists, neurophysiologists expressed in statement after statement complete confidence in this position. There is ample evidence, to be sure, that man's brain, in structure, chemistry, electrical and physiological properties, in all ways tested, is different from those of related animals only to the normally expected degree. There is ample evidence that the gap between brain and mind is closing under the impact of electrical and other techniques; just as, in the past decade, the hiatus at the molecular level, between component particles and cell architecture, has been filled, with the aid of electron microscopy and other physical procedures, and that at the organismic level, between genes and somatic characters, by enzyme studies and other chemical methods. Part of this address will, indeed, be given to tracing the closing of the brain-mind gap.

Still, it remains today a matter of faith rather than of proof that all behavior ultimately is explicable neurologically. Such faith is surely pragmatically sound.

There remains a positive argument of its usefulness, for a belief in lawfulness and regularity. If man believes in laws, he will seek them—and perhaps find. If he has faith that the universe is in-

telligible, he will continue his struggle to understand. And much faith is required; for the way is long and barren and strewn with the wrecks of failures. One must indeed believe in the buried treasure to persevere in the search for it. Perhaps this is what Einstein meant in saying, "Without the belief in the harmony of the world, there could be no science." For lack of this faith, [many] conclude that scientific history or sociology or ethics or psychology can never be. For lack of it, men have said that the vital action of bodies is unknowable, that the weather is unpredictable, that the mind is inaccessible. For lack of it, the Middle Ages were the dark ages, and *with* it came the Enlightenment. And with it also came the more humane treatment of the sick, the insane, and now the criminal as unfortunate victims of physical, mental, or social disease rather than as willful sinners (4, p. 225).

THE MIND-BODY PROBLEM

Some general matters must be examined squarely, if briefly, before turning to the more comfortable domain of neurophysiology. Surely the central problem in the relation of neural mechanisms to psychological events is the old one of mind-body, recently dramatized—and circumscribed—in the term psychosomatic. This relation involves also that of subjective and objective, of internal and external, and so the system to which something is internal or external. I have found the term "org" useful in denoting most generally a single system (or organism in the wide sense) composed of interacting subordinate units.³

It is so used in the following summary of my own view of the mind-body relation:

That every org or system offers both physical and mental aspects; that there is the same sort of continuum (in kind if not degree) of awareness as there is of body from the simplest inanimate system to the most complex living organism; that what is private to the org, viewed from the internal aspect, is recognized as subjective and mental, and, viewed externally, the org is seen as objective and material; that each org is a unit in a more inclusive org or is composed of subordinate orgs or, mostly, is both composed of and helps compose other org units so that subjective and objective interplay from level to level; that, to the extent that a given org is poorly integrated and but little set apart

³ "An org has persistence in time and boundaries in space both of which may be short or ill-defined. During its recognizable integral existence, however, or during some differential segment of it, the org endures in approximate equilibrium. Within it there exist interactions between parts and between part and whole which also endure as constants" (5, p. 341).

from other systems or the rest of the universe, the distinction between internal and external approaches meaninglessness and subjective awareness tends to vanish; and that material and mental are relativistic terms which involve the relation between the observer and the observed (6, p. 501).

If mind and matter are but different aspects of the same entity, it is useless to ask if material events cause mental ones or if the psychic can act on the physical. Man, seeking knowledge of the universe, may find the clues, now from his inner experience, now those from the outer world, more pregnant with suggestions for study. It may be convenient and useful to think of an anesthetic producing unconsciousness or of a neurotic state producing gastric ulcer; but ultimately we will recognize the physical situation in the brain, seen most simply as induced by a chemical agent, of which unconsciousness is the concomitant of greatest interest; we will recognize the physical part of the situation, most interesting in its psychological aspect of neurosis, which generates another situation, of most concern in its physical aspect as ulcer. In comparable manner, the relation between successive states of a system is sometimes most easily grasped in terms of the first as the cause of the second, sometimes, of the second as the purpose of the first. Either may suggest the direction in which to seek for the mechanism of the relationship (6, p. 501-2).

The basic point in these passages, and the main plea to you who face the problem daily, is to avoid the disaster and confusion that results from the careless admixture of different levels of discourse. Mind does not act on matter nor matter on mind. There is only an antecedent mind-body state and a consequent mind-body state, whether mental or physical aspect chances to present more acutely. Indeed, even the familiar notion of "acts on," of causality (and volition) in relation to lawful regularity, is under scrutiny (see 4, p. 222).

This can all be given point at a favorite level of argument, as to the cause or genesis of psychoses. The constitutionalists and the organicists and the environmentalists and the mentalists too often are quarreling with each other as to which of them has *the* cause. Now, it is obviously useful to find out that schizophrenics have abnormal capillaries in their fingers, that they had abnormal experiences in their childhood, and that they have abnormal individuals as parents or sibs; but one does not exclude the others and no one of them can possibly be the whole story.

It is surprisingly difficult to teach biology students, when discussing heredity and en-

vironment, that it is never sensible to ask the question, "Does heredity or environment determine some characteristic?" It always takes both heredity and environment; and the meaningful question, which is mostly not asked (in the psychiatric realm also), is a quantitative one. "Within the permissible limits of variation of the hereditary factors, and of the environmental factors, what is the correlation between hereditary variance and the variance of the somatic character in the organism, and between the environmental variance and the variance of this character." The answer will be different quantitatively from case to case, probably all the way from 99% to 1%. You recall that heredity "completely" determines sex; two X chromosomes give a female and one a male. But let me also remind you that environment "completely" determines sex; frog eggs that normally develop into 50% males and 50% females, can be diverted to 100% male or 100% female by changing the concentration of salt in the solution in which they are kept.

Another facet, the organ neuroses in the psychosomatic area, deserves further attention. It is obviously of enormous worth to establish correlations between particular psychological patterns, certain neuroses, and particular physical manifestations, tics, enuresis, high blood pressure, asthma, ulcer, what you will. But that is only the early naturalistic phase of science, the recognizing that things are related. It is not yet, in any sense, an explanation; it doesn't reveal a mechanism. The same is true in the reverse direction. To find that particular kinds of dreams are correlated with ovulation or that typical psychotic behavior can be associated with a tumor is certainly valuable, but falls far short of indicating mechanism.

Now, in some of these areas rapid progress has been made and the mechanistic chain is beginning to be quite clear. For example, this sequence has been traced in certain anxiety states: anxiety leads to overbreathing, extra carbon dioxide is washed out and the blood content lowered, low carbon dioxide induces constriction of cerebral vessels and inadequate nourishment of certain neurones, local metabolic disturbance evokes discharges. One can even reproduce, by controlling CO₂ in the inspired air, the full

symptomatology of disordered action of the heart, or neurocirculatory asthenia. Or, again, if the tumor referred to above is a pancreatic tumor producing excess insulin, there follow: low blood sugar, inadequate fuel to the brain, imperfect functioning of the cerebral neurones, delusions of one sort or another. Intravenous glucose wipes these out as sunlight does shadow. In these instances, at least some of the links are at hand. We are less far along when able to say only that a suppressed oral receptive desire leads to excessive vagal discharge, and so to gastric ulcer; or that some damage of the nervous system leads to a deterioration of intelligence. Too many links are still missing. Even here, however, clues are accumulating.

A young pharmacologist recently studied the influence of mescaline on the oxygen consumption of brain, with different substrates, and found it inhibited all except succinate. He then tried the obvious experiment of administering succinate to normal human subjects who were in the phase of mescal hallucinations, those magnificently rich color-space constructs of the mind. Practically as fast as the succinate got to the brain the hallucinations vanished. Or, from another angle, Penfield has pointed out that temporal lobe seizures result in hallucinations and illusions, psychic convulsions if you will, which clearly involve the activation of acquired neurone patterns, not simply of inherited ones. The hallucinations so evoked are unique to the individual and depend on his particular experience and memories.

Now these considerations have rather important consequences for therapy in psychosomatic disorders, especially of the organ neuroses. Obviously, one would like to break the pathogenic chain as near the beginning as possible and not as near the end as practicable. We would like to treat rheumatic fever by killing the streptococci in the blood, not by doing valvulotomies on the heart. We would like to stop hyperthyroidism by correcting the blood iodine, or whatever the factor or factors finally prove to be, that stimulate the thyroid, rather than by thyroidectomy or even by suppressing the gland's action with thiouracil. We would certainly like to treat gastric ulcer, not by removing the stomach or even by cutting the vagus

nerves, but by dissolving "the cause." In our present state of knowledge this cannot be identified better than in terms of a particular neurotic constellation; but that is the level at which we would like to treat ulcer. And it is rather interesting that merely blocking the efferent discharge from an abnormal "psychic" situation may fail ultimately. Removing a cancer metastasis without the original focus doesn't do much good; and many neurotic ulcer patients, deprived of the opportunity to discharge their neurosis in the form of an ulcer, whatever the mechanisms be, acquire new routes of discharge and become alcoholics or suicides. I do think that the present way in which we handle individuals who are intolerable to themselves or to society, by decerebrating them or even by sledge-hammering the brain with electrical or chemical shock, is a very transient phase. Someday, and I would guess in the near future, such treatments—great advances though they may have been—will have a musty medieval odor.

One more matter that must be touched upon concerns free will and purpose and the derived problem of value. These certainly exist for man subjectively. Do they exist objectively and are they limited to man? May I again condense by quotation?

Much direct evidence supports this conclusion (that volition is determined). Most of man's problem-solving activity is actually unconscious and so certainly not directed by a conscious will. Under posthypnotic suggestion, a person will perform some unusual act—known beforehand to all present but himself—and will be completely persuaded that he acted of his "own free will." Conversely, the compulsive, despite every effort of his conscious will, performs acts of which he disapproves—such as unending repetition of washing his hands. Recently it has been discovered that, during recovery from a chemically-induced coma, a person may "will" to clench a hand, in response to a request, but nothing happens. A minute or more later, while the subject may be busy "willing" to move a foot, the hand suddenly clenches—to the complete surprise of the subject! The observant friend, only less than the trained psychiatrist, can predict with impressive accuracy how a person will decide and what he will do in a great variety of situations. And so on and on through the familiar phenomena and arguments.

Perhaps man should have been able to deduce electron indeterminacy from his own private feeling of freedom, just as he has had to follow from the overwhelming determinacy of the electron and more molar systems to the overwhelming deter-

minacy of animal and human behavior. Certainly we are closer to the internal view of man's mind than of the electron's "mind" and must exploit this vantage point fully in getting clues as to the direction of analysis in the external dimension. Artists, especially poets and other writers who deal with man's inner life, have contributed greatly in noting and clarifying the phenomena ultimately to be analyzed and synthesized as the naturalist-observer has supplied the raw factual nuggets which were beaten by the theorists and experimenters into such syntheses as evolution. Subjectively, man recognizes purpose as well as volition, values and ends as well as strivings and means. These clues to nature have been used widely, if not always wisely, in scientific, especially biological, thinking. When the mischievous confusion of personified willing or purposing as a cause of material happenings is avoided this has been very profitable (6, p. 502-3).

All structural development and physiological activity of individuals is a succession of solved problems, with shifting values. Blood is shunted to the muscles when one runs, to the gut during digestion; to the skin "to nourish" it, yet from the skin, which may be sacrificed "to conserve" body heat. A hand is jerked reflexly from a hot bar "to avoid" injury, but it will grasp the same object reflexly "to maintain" balance. Almost always the physiologist first sees meaning in phenomena in terms of such purposes; as analysis proceeds he discovers new phenomena which enable him to think upstream in time, in terms of mechanisms. (Mechanism adds utility to truth.) There is no reason to view man's purposing differently, it is only more difficult to emerge from the immediate internal view of it (6, p. 511).

Northrup states:

The traditional argument of the dualists and idealists—that purposeful teleological behavior cannot be accounted for by means of scientifically verified psychology and neurology because the latter sciences give no basis for memory, universals, and purposes—and the argument of the early modern naturalists, mechanists, and their sociological followers to the effect that purposeful teleological activities and the theoretical ideas defining human goals are mere epiphenomena of no causal significance, representing mere pseudorationalizations after the fact, because again such factors are incompatible with mechanism and a scientifically verified theory of human nature, therefore apparently rest upon a common confusion and a false premise. This false premise is that teleology and mechanism are incompatible (7, p. 415).

The physiologist's whole life is concerned with problems of organic purpose, though he rarely likes to say it, particularly in public. We see purposeful behavior all through the body; it is the only way it makes sense to us. And then we look for the mechanisms to account for it. We see purpose in the

sense that a stimulus initiates a train of mechanical reactions, the last link of which is such as to eliminate the stimulus, to restore the *status quo ante*. Now, in another language, of electronics and engineering, we speak of such a system as a negative feed-back system. The system tries to come back to its own dynamic equilibrium position. If the circle of events does not remain within the nervous system, or even within the body, but loops out from the body into the external world and back, then we have purpose in the ordinary organismic sense of the words "purposeful behavior."

Let me briefly illustrate this. A negative feed-back in a radio gives automatic volume control. (A positive feed-back gives howling.) At the simple reflex level, a common example is: a rise in blood pressure stimulates the depressor receptors, which evoke a reflex through the brain stem to slow the heart and dilate the vessels, and so lower blood pressure. Another: excess thyroid activity increases the thyroid hormone in the blood, this suppresses thyrotropic hormone production in the hypophysis, and so decreases activity of the thyroid back toward normal. The situation is equivalent when we turn to hunger and behavior. Despite some experimental disagreement, a picture of the sequence is: no food, low blood glucose, stimulation of vagal centers and discharge down the vagus, stomach hypermotility, afferent sensations from the active stomach, which lead subjectively to hunger and objectively to restlessness and seeking about in the environment instead of sleeping. When the animal finds food, eats it, and restores the blood sugar, the cycle is complete. The seeking-for-food behavior of an animal is purposeful behavior in the fullest sense.

One further refinement in the analysis of purpose is receiving increased attention, especially by analogy to man-made machines. In servo mechanisms, used so widely in industry, there is built not merely a negative feed-back system working toward a fixed goal, but a device that can alter the goal it seeks. In such goal-seeking systems, behavior is continuously directed and corrected, controlled at each moment by the error between the actual behavior and that correct for reaching the goal. Again let me

exemplify quickly. A torpedo following the sound of a ship's propeller, despite zig-zagging by its victim, is a servo mechanism seeking a goal purposefully and guided continuously by signals from the goal. So in the muscle stretch reflex for muscle tone. From the muscle spindles, stimulated by stretch, impulses run to the cord, through a two-neurone arc, and back to contract the muscle. This is a simple feed-back mechanism, tending to keep muscle tension at a constant level. But upon this local system play paths from higher neural regions, such as the cerebellum, which alter the tension level to which the stretch reflex returns, the goal it seeks. There is, then, such further sophistication, in man and machine, of seeking goals and changing goals, of purposeful behavior and altered purpose and values.

On values, I draw your attention only to the following comments:

One stock objection to a science of values is that "ought" is beyond science. Yet this word, with all except the volitional connotation, is continuously used outside the sector of human actions. And, more weighty, the very notion of "ought" like that of "must" or "true," or "cause," is implicit in the functioning of brain and mind. The whole process of conditioning shows, in animals as clearly as in man, the un verbalized and unthought axiom; ||past regularity *ought* to extend into the future(6, p. 512).

When man, proud possessor of an overstuffed brain, calls the brain the most "valuable" organ and himself the highest form of life, he does well to suspect himself of anthropomorphizing. Valuable by what criteria? Animals can at least live without brains, they die without many other organs. But when he discovers, in many animals, that during starvation all organs waste away, are used for food, except the brain and heart, which are fed by the others: that a special reflex device is built into the arteries to the brain so that, within the limits of possible adjustment, the brain is insured its full blood supply whatever happens elsewhere; that the brain is more elaborately protected from injury than any other organ, even than the growing embryo, for it, like the embryo, is floated in a shock-absorbing fluid and, unlike the heart, is completely encased in bony armour; that success in winning habitats and capturing food parallels the development of the brain more than any other attribute; when man discovers these facts, he can feel distinctly more secure in his value judgment about the brain and so about his position. Not only man's mind, but his body and other animal bodies "value" the brain(6, p. 503-4).

I see no reason why value problems are extra-scientific. Psychologists study animal learning and actions in terms of "goal-directed" behavior, bi-

ologists recognize values in body organization, function, and evolution, psychiatrists expose unconscious drives which underlie conscious purposes. All see ends and seek mechanisms. All find, with increasing success, factors in the organization, history, and environment of individuals or types which account for their particular values; all can trace values, more or less precisely, even quantitatively, back to biologic "needs" and forward to predicted actions (6, p. 511-12).

And do not forget the pet dog who develops values of good and bad under his master's tutelage.

PSYCHOANALYSIS AS A SCIENCE

One other matter requires brief attention before turning to neurophysiology. Can psychiatry, and particularly its subdivision, psychoanalysis, be considered as a science or not? I see no reason whatsoever for taking the negative view. The qualifications of the psychiatric investigator, even of the practitioner, are not basically different from those of other investigators, although there may be some difference in emphasis. I sometimes jokingly call myself a godfather of American psychoanalysis because over half a dozen men and women who obtained a Ph. D. in physiology with me are now psychoanalysts. They could make the transition quite easily. The objections raised to regarding any of the mental sciences as "science" are fairly familiar ones: that their field is subjective, the material cannot be reached objectively; that it is nonquantifiable; that the operator influences his phenomena when he experiments; that the subject must cooperate. A major difficulty is that science deals with categories and classes and not with individual cases, yet the psychiatrist is concerned with the individual (so is the physician!); and finally comes always the problem of values and purposes, which we have examined. I have elsewhere refuted these objections in detail and can offer here only some brief excerpts.

There is a subjective element in every system, and we are only peculiarly happily situated in the case of man to exploit the clues presented from our own consciousness. Introspection, like any observation or exploration, yields grist for the mill of analysis. But the mental sciences, no more than the others, halt at the stage of the naturalist; and the further analysis is, for them also, at the objective level. It is commonly overlooked, despite the

impact of behaviorism, that men judge one another—under study or not—entirely by objective evidence; by what they do, how they look, what they say. It is urged that behavior is no index to the "real" thoughts or feelings of a person; but this is, even now, an overstatement, for successful judgments of this sort are commonly made by sensitive laymen and regularly by expert psychiatrists. And as knowledge grows and techniques develop, the demonstrable correlation becomes ever finer.

The humorous result of testing a lunatic, who regularly claimed he was Napoleon, on the "lie detector" yielded powerful support for this position. Being asked during the test, "Are you Napoleon?" he craftily replied, "No." But the pulse and respiration changes registered a lie. Clearly, in his belief, he *was* Napoleon; and this belief could be objectively established. By study of the bodily concomitants of mental states, by noting behavior under selected conditions and with few alternate possibilities, by pitting one possible satisfaction goal against another, by the rapidly developing technique of attitude scales, personality trait tests, and the like; by all these means and many more certain to be devised, subjective states can be identified and quantified (still only roughly) from the objective aspect (6, p. 507; see also pp. 500, 506, 509).

So much for the negative arguments; what of the positive ones? Remember that a good analyst can often predict the future course of an analysis being made by another analyst, as in the training situation. I have several times seen an analyst, presented with a patient *de novo*, predict backwards from the presenting situation what some of the early life experiences of this person should have been, and seen these deductions promptly verified by the already-written history.

Psychoanalysis has, in several cases, pointed the road of physiological experimentation and conceptual advance. The id, the ego, and the superego are clearly counterparted in diencephalon and telencephalon mechanisms, and the patterns of emotional and rational behavior fit into those. As a matter of fact, Cannon started his famous orbital leucotomy experiments on cats (he surely never expected it would be done on man!) partly under the influence of Freud's thinking. In 1935 I had the rather exciting experience of visiting Pavlov in Leningrad and, a few days later, Freud in Vienna. We talked, Pavlov and I, of his animal neurosis experiments and he casually dropped the comment that he had been stimulated to do

those experiments by reading Freud's work. When I mentioned this to Freud, he said, "Hmph, it would have helped had he said that 20 years ago."

Psychiatry can surely be a science. I should like to emphasize to its followers that, because of the many unique opportunities not merely to treat patients but to do perfectly legitimate experimenting at the same time, they have a rich opportunity to advance physiology, just as the great clinical neurologists advanced physiology in a past epoch. Whatever may be the final fate of brain operations for behavior disturbances, it would be tragic if, as seems to be the tendency, the observational possibilities of this material are not thoroughly exploited.

THE PROBLEMS OF MIND AND BEHAVIOR

What, then, are the problems of mind and behavior that demand insight in terms of neural mechanisms? Consciousness itself is, of course, the main one—though we can give it no further attention now—and its variations normally in sleep and attention and abnormally in unconsciousness, hallucination, split personality. Another great group is concerned with learning, remembering, and recalling, and with the abnormalities of amnesia, suppression, hypnosis. A third group includes ideation, reasoning, imagining, and their disturbances in the aphasias and dementias. Finally, turning from the conative aspects, is the great group of emotions, drives, and purposes and their aberrations in the neuroses, in anxieties, compulsions, organ neuroses.

Or, to phrase the problems at a different level: How can we account for the fact that some 10 billion neurones in the brain collectively give rise to a single personality and consciousness? Why does learning capacity parallel the total mass of brain available? How do thousands of these neurones come to work together in complete synchrony? How are effective functional connections established between two regions of the nervous system when they are kept simultaneously active, as occurs in conditioning and learning? How are complex regularly repeated temporal patterns of motor activity formed and released, as in tying a bow?

What occurs in the cortex to distort visual or tactile experience so as to produce the figural after-effects? Why are psychic seizures associated with temporal lobe over-activity; why unconsciousness with the inter-laminar system of the diencephalon; why kinesthetic imagery (in Rorschach tests) with superior talent? These are problems posited in terms of neural masses, of the many units operating in some collective manner.

To translate yet again, now to the cellular level, the questions take the form: How do neurones interact on one another, and the nonneural environment—chemical, thermal, electrical, etc.—on each, so as to alter a given unit; to increase or decrease its discharge of impulses, its threshold, its metabolism, its potentials?

Messages bombard [the nerve cell] along these many paths, some pushing it to action and some to quietude, some perhaps powerful enough to tip the balance individually but most surely requiring the help of their like fellows. Further, the nerve cell is being influenced by the blood passing it, by the oxygen and sugar it receives, the salts that bathe it, the electric currents from its neighbors, the temperature at which it finds itself, by drugs which reach it. And from this welter of influences—its state of health, the condition of the environment in which it is living, and, particularly, the clamor of allied and opposed messages reaching it—from all this comes a single result: the cell fires messages along its own fiber to still other cells, or it does not fire. There is, to be sure, some graduation in number and frequency of impulses sent or in duration of inactivity and depth of inactivability, but essentially the balance is between action or no action. Just so the judge, depending on the state of his stomach, or the temperature of the courtroom, or the bombardment of arguments on each side of the case, renders a single decision for or against. (Freedom of the individual to make the decision is equally easy or hard to discover in the nerve cell and in the judge.) It is the collective and patterned actions of the several billion nerve cells of our brains that determine our thoughts. We must explore further this neural patterning (1, p. 494-5).

NEUROPHYSIOLOGICAL MECHANISMS

Of course, the resultant of any action upon any system includes the nature of the system acted upon; and the neural and mental events provoked by an experience depend also on the nature of the brain and mind in which they transpire. Man's mind can act upon sensory data only in terms of its own organization; all experience is sieved through the "a priori net of the mind," in Eddington's telling

phrase, and Koffka has emphasized that thought itself carries a "tone" of true or false. In material terms, this is to say that the structure and function of the nervous system determining the future adventures of nerve impulses which reach this organ; or, more generally, the consequences of any given action upon the nervous system depend on its general organization and particular state. The "universal" truths are those which are built into the brain machine and are difficult even to discover and recognize, let alone to analyze in terms of mechanism.

Yet real progress is steadily made. "Generalization," "extrapolation," "closure" as recognition of entity, "insight," "relationship" in "more than" or "nearer than" or even "better than"—all these can be demonstrated in animal as well as human behavior, studied quantitatively by such laboratory techniques as the conditioned reflex, and related, still gropingly, to the physiological anatomy of the brain (6, p. 504-5).

We must renounce here the consideration of many facets that reflect some illumination. Much is known of the mechanisms of in-born (or maturing) coordinated sequences of motor activity, though not of how a paralytic comes to run under acute stress. Much is known of the progressive integration of sensory messages from periphery to centers, though not of how stocking anaesthesia comes about—even with the clear finding of a stocking distribution of sweating. The action of the nervous system on other organs—via autonomic outflow, hormonal and other chemical influences—is well sketched-in, however much detail is lacking, as in the organ neuroses. And many crucial points have been revealed in the interactions of cortex and diencephalon: the ability of cortex to fire or check the hypothalamus and of thalamus to fire cortex and to control the sensory input to it and so attention; the existence of paths and circuits between these structures that influence thresholds and electrical pulsations; and much more. Let us rather examine the central organ itself. It will be profitable to do so in a semi-historic fashion.

What was the picture at the turn of the century? The anatomical relations of the nervous system had been outlined and a rough localization of function established. Such landmarks as the Bell-Magendi law for spinal root conduction, the irritable motor region of the cortex, of Fritz and Hitzig, even Broca's convolution associated with aphasia, were well known. The neurone doc-

trine was becoming thoroughly proven, by Waldeyer, Harrison, Golgi, and Cajal. Hughlings Jackson had had his insight into a gradient of dominance and subordination in the neuraxis. The major properties of the nerve impulse were familiar. Since du Bois Reymond it was known that electrical phenomena were concerned; Helmholtz measured the speed of the nerve impulse; the all or none law was established, by Lucas largely; and there existed even a satisfactory theoretical interpretation, still largely valid, in terms of Bernstein's membrane hypothesis. Gotch and Horsley had managed to trace impulses into the nervous system. One other major achievement was just coming over the hill of the past—Sherrington's work and insight establishing the integrative character of the action of the nervous system.

These accomplishments, fundamental though they were, left the nervous system severely limited. It was completely static. Like the telephone exchange, it waited until called into action. It had no metabolism nor increased energy turnover when functioning. It was bound temporally to the stimulus plus the time needed for an impulse so initiated to travel fiber paths to, in, and from the central organ; otherwise, nothing. It was bound spatially, in that impulses started in particular neurones, went along preset paths, and reached thereby predetermined destinations. It was absolutely set in magnitude or number by the iron corset of the all or nothing law; only quantal impulses traveled a nerve fiber. Such a static nervous system worked admirably in accounting for inborn, routine, automatic, invariable reflex behavior; the study of such behavior led to the picture. But it was completely helpless in explaining variable behavior, learning, memory, individuality, and the collective action of the neurone population of the whole brain.

Every advance in knowledge during the past half century has been away from that static picture and toward a dynamic one. We have gained progressive emancipation from temporal, spatial, and quantal strictures on neural mechanisms and consequently have achieved new levels of freedom in accounting for performance. Such a change is not unique to neurophysiology. The same trend has been manifest in psy-

chiatry and psychology and, indeed, it is a sequence regularly followed in the history of science. Each science moves from the static to the dynamic: mathematics handled fixed integers and constants long before it mastered variables; in physics, statics, hydrostatics, electrostatics, even thermostatics, antedated dynamics, hydrodynamics, electrodynamics, thermodynamics. In psychiatry, Freud gave the main dynamic impetus; in psychology the Gestalt workers, with their total patterns and fields, were important, as was Lashley's demonstration of the equivalence of stimuli on the afferent side and of responses on the efferent, in relation to learned reactions. And in methodology, Thurstone's factor analysis and the various apperceptive techniques, especially that of Rorschach, require note. Indeed, in each of these fields, and perhaps even more strikingly in the physiological area, an advance in methodological skill, invention, quantitation, validation has been the touchstone for important advances in understanding. True, some one first had to have an idea relative to which he developed the method—they go together—but the method has been absolutely essential.

In physiology, several techniques have sparked our advance, including microchemical ones, but two have been critical in the area of our present interest: the electrical and what I might call the micrurgical. The advent of amplifiers and oscilloscopes enabled physiologists to increase sensitivity at will and with a parallel gain, rather than the usual loss, in speed. Potential changes of microvolts can be followed with assurance over microseconds as desired. This powerful tool, applied first to peripheral nerve and then to the central nervous system, by Erlanger, Gasser, Bishop and many others, has been enormously useful. It is so effective, in fact, that it became possible and imperative to direct it to single units rather than remain content with the scrambled signals from masses of them. So, by actual mechanical dissection or by selective microelectrodes, investigators have focussed on the elemental structures. Adrian and Bronk obtained single vertebrate nerve fiber potentials; Young discovered the giant fiber of squid nerve which was promptly exploited by Cole,

Hodgkin, and many others; a single neuromuscular junction was isolated by Kuffler; neurone and synaptic potentials, down to single ones in the best cases, were measured by Forbes, Eccles, Davis, Lloyd, Bullock and a horde of other eager students.

The outpouring of results of such research has created, in the past couple of decades, a completely new microphysiology of the nervous system. We have today an extraordinary amount of precise and detailed information about the properties of the neurone; conditions of its activity, transmission across the synapse, and so on and on. This has given some increase in freedom. Synaptic transmission, for example, no longer is in terms of a fixed anatomical connection which a single impulse approaches from one side and either does cross and move on or does not. What occurs at a given synapse can be highly variable. Often the number of incoming impulses, their distribution between many fibers reaching one cell body and their temporal pattern in the one or many, is decisive in whether or not the postsynaptic neurone is fired. Moreover, a reflexly evoked motor discharge is rarely single; most units fire repetitively. The times involved are not limited to conduction and synaptic delays of half a millisecond. Important events continue long after the action potential spike is over in a thousandth of a second. Even the critical event of discharge may be delayed tens of milliseconds, and potential and metabolic changes continue for tens of minutes longer. Thresholds are sharply altered and may oscillate over seconds or more; and some impinging impulses inhibit rather than excite. All is not over when an impulse flashes across a synapse and on to its destination. It leaves behind ripples in the state of the system. The fate of a later impulse can thus be at least a little influenced by the past history of the neurones involved, by what has happened before—and when. So we begin to get some increased freedom in accounting for behavior.

Much more valuable and provocative from the present point of view has been the discovery, rather than the creation, of a dynamic macrophysiology. The finding by Adrian that electrical rhythms could be obtained from insect nervous systems, even

without the insect; our similar finding of regular beats in the isolated frog brain, and Bremer's results on the separated cat cerebrum; the dramatic discovery of Bürger that, even in the undisturbed human, the brain exhibits potential waves; these and many more exploded the static nervous system. They gave us spontaneity, active not passive behavior of neurones; as earlier studies on heat production and respiration of nerve fibers had proved that nerve impulses are carried actively rather than passively. They gave us an internal clock, a regular rhythmic beat, and so a new means of grappling with the time dimension and a hold on mass action. They placed the nervous system in a maintained state of activity, which could be decreased as well as increased, and so made inhibition more important and meaningful and more easily interpretable.

Another major step toward a dynamic macrophysiology was the insight, first suggested I believe by Kubie but independently by Lorente de No who tremendously developed it, of self-reactivating neurone chains. A message enters one neurone, crosses a synapse to a second, a third, a fourth, a fifth. But it need not end the series by leaving along an efferent neurone. The last elephant can take the tail of the first in its trunk; a fiber from the last neurone can return to the first, and the impulse recirculate in a neurone ring. Such a trapped impulse might circle indefinitely. With one sweep, the usual time limits have been overwhelmed, an impulse is no longer bound temporally to the stimulus that initiated it. Such reverberating activity need, in principle, never end; particular circuits might represent enduring memories, set up by experience and learning. Recently, McCulloch and his colleagues have pointed out an important corollary: the particular is tied to a singular experience—this object; but the stimulus-severed response, the enduring reverberation, can account for the induction of universal ideas—this class. Such circuits also give mechanism to the phenomena of closure and gestalt, as does still another discovery that has added a major freedom.

The existence of mass action and of fields able to determine neural activity makes possible over-all dynamic patterns instead of the fixed and punctate activation of particular

neurones. The existence of such attributes was strongly indicated by the work of Lashley, Köhler, and others although the brain mechanisms underlying them remained unknown. Work in our laboratory, among others, has demonstrated the presence in brain of "direct current," relatively steady potential fields, which are quite different from the usual oscillating electroencephalogram. Potentials, across a fraction of a millimeter of a frog's brain, from pial to ventricular surface, may be 3 or 5 or even 10 millivolts, not microvolts, in magnitude. Changing these field potentials, by feeble polarization, can start or stop the spontaneous rhythm. A relatively slow shift in the DC potential can spread, at a few centimeters a second, over the frog's hemisphere and can cross a complete anatomical transection in so doing. Conversely, changes in cortical function are associated with DC potential shifts. With the wave of inhibition (Leao) that spreads over a rabbit cortex is a rising negativity, a sharp positive swing as irregular spikes appear, and a return to normal. A single episode may last minutes and involve a steady potential swing of 15 millivolts. And strychninizing the cat's brain, for example, can produce a potential shift of the drugged region of 50 millivolts! These potentials are large and important.

Such potential fields have been invoked by Köhler in a satisfactory interpretation of figural aftereffects and he is seemingly succeeding in obtaining functional DC potentials in man. Conditioning phenomena also find a more comfortable mechanism in the confluence of two electric fields on neurones lying between them than in particulate impulses that would have to "know" the state of a center they have not yet reached. And, of course, brain fields have long been in demand to account for perceptive fields, for gestalts. In general, the possibility of one neurone influencing another by the potentials it generates and the consequent flow of currents in a structured volume conductor—independent of or in addition to the discharge of nerve impulses along axones—has given complete emancipation from the telephone picture. With potential patterns extending over macroscopic regions, the neurone group supersedes the individual cell as critical to performance.

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This is not to discount the action and importance of neurone nets. On the contrary: besides all the material presented earlier, these are proving ever richer in their performance, are being defined grossly and microscopically with rising precision, partly along the lines laid down by Dusser de Barenne and McCulloch, are demonstrated to exert inhibition no less elaborate than excitation, thus giving a double control, and so on. But the existence of potential fields, and of spontaneous rhythms, greatly expands the behavioral capacities of neurone nets and reverberating circuits.

The emerging neural mechanisms, then, have swept past the strictures of the earlier ones. No longer is response linked rigidly to stimulus, or presynaptic to postsynaptic neurone. Experience can be stored in the brain over indefinite times. One neural unit or group can substitute for another. Behavior varies with the current state and past history of the nervous system as well as with the impinging environment. The brain can function as a unitary whole, not merely as the sum of billions of units. Between input and output can exist flexibility in time, space, and number, and the past is not neurologically lost.

The end, of course, is not yet and important further advances are coming over the horizon. Some are foreshadowed in current trends. For one thing, we are finding other signs of unlimited latitude in time. Reverberant circuits, in principle, could last indefinitely, but in practise their duration is doubtful. They demand continued energy expenditure and are wasteful. They should be stopped in sufficiently deep coma or anaesthesia and not automatically reinitiate themselves, as most memories do. They should easily be altered or disrupted by other normal activation. Perhaps there is a short-lasting active memory, depending on circuits, and a more enduring static one. Its character—like a magnetic wire or a card filing system—and its mechanism remain unknown. It is probably not unrelated to the long structural memory seen in an organ that has hypertrophied as a result of activity. As I wrote recently:

If such indications (of local memory traces) hold up, a rapid advance in understanding in this

field is imminent. Perhaps learning is initially a function of the whole brain and as ephemeral as a pattern of activity. But even activity leaves some more permanent change in the active part—think of the hypertrophy of an exercised muscle. And brain regions which are most active in particular patterns—think of the nodes and internodes of crossed wave trains—might well acquire, with repetition of these patterns, alterations which are both more local and more enduring than the initiating disturbance. With such regions located it will become practicable to look for the kind of change which endures: change in chemical composition or metabolism, electrical potential or resistance, cell structure or connection, or whatever it turns out to be when found. The figure of a river and its bed, used so vividly by Child in picturing the general relation of structure and function, is apposite here. The river carves its bed and the bed controls its waters; only by their continual interplay can a particular system develop. The spring floods are mass responses of the whole to environmental conditions and are transitory dynamic patterns, yet they leave local and lasting changes. Where the waters pile up most and the currents are swiftest—where the activity disturbance is most extreme in a particular total situation, as the potential fields in the occipital lobe on visual stimulation—there are produced the washed-out banks or the undercut cliffs which determine the river's flow for decades to come—the concrete regional changes wherewith the past directs the future, the basis of memory (1, p. 497-8).

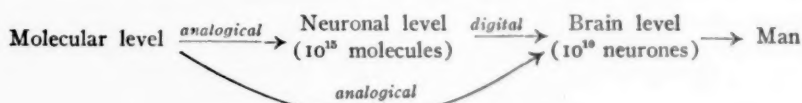
In any event, states of enhanced activity of the nervous system, almost of maintained physiological inflammation, can last for months or years. These are seen clinically in relation to causalgia and have been obtained experimentally in referred pain phenomena. A heavy barrage of afferent impulses can provoke a central hyperexcitability, much like strychnine, so that a small continuing inflow is able to maintain pain. Interruption of this mild reinforcement, by temporary nerve block, may allow the whole conflagration to subside. A possible relation to seizures and epilepsy is obvious.

Another most promising trend is toward the quantitative. When theory makes successful numerical explanations and predictions, the outlook is good. Many workers are pooling their wisdom in this approach, catalysed especially by meetings sponsored by the Macy Foundation. From these sessions, participated in by experts, from the mathematicians von Neumann and Wiener to the philosopher Northrup, and genially prodded by McCulloch, have come insight-

generating comparisons of computing machines and brains and application of the calculus of propositions to the latter. Nerve nets have been shown capable, in principle, as are also the automatons, of answering any question formulable as a proposition. The anatomical fact of the much greater possible

example, the spread of activation within the cortex by continuity and very possibly without the use of the neuropil—I mention it only because it may create some satisfaction in you as it has in me (8, p. 55).

The over-all problem is perhaps summed up in this simple diagram:



input to the nervous system (several million impulses per millisecond) to output (less by a factor of 10 or better) has been given a rational meaning and related to the information carried. A mathematics of purpose is being formulated. The distinction is being drawn between digital and analogical systems: the former, discontinuous like scalar devices for Geiger tubes, depending on the go-no go response of a unit, whether a neurone or an electron tube; the latter, like a condenser adding charges, depending on translating one quantity into another measured one in continuous fashion. Digital systems are all-or-none, precise, and expensive. Neurone nets are such and should work well in accounting for reason. Analogical systems are graded, less accurate, and simpler. Hormonal and other chemical effects as well as steady or oscillating potential fields are such and should work well in accounting for emotion. Perhaps both operate in the interaction of diencephalon and cortex as in the following model recently suggested.

The picture that has seized me at the moment is that of the cathode ray iconoscope. From the deeply-buried electron gun (the unexplained drives of normal or excessive activity of the diencephalon) the electron beam (consciousness and attention) is directed by controlling plates (impulses playing upon the "conscious center" and its efferent connections), to the tube face (cortex). Here it illuminates a region with an intensity depending on its present voltage and on previously deposited charges on microscopic droplet condensers. As the beam scans this surface, partial or complete pictures emerge, depending on current conditions and past residues; as the diencephalon impulses similarly scan the cerebral cortex, corresponding pictures flash in consciousness and give direction to simple sensori-motor coordinations. I know as well as you that this is no more than a figure of speech and may do little good and much harm if taken as the basis for further experimentation—this completely omits, for

SOCIAL ASPECTS

I have argued and written at some length for the view that society is a type of organism, an epiorganism. Units of this are the individual organisms, man in the human case; and its internal environment, like blood plasma and tissue fluids, is the culture of the group. Just as sociology is the physiology of the epiorganism, so psychiatry I would call the neurophysiology of society. And as physiology cannot limit itself to a study of the individual neurone but must also take into account interrelations and interactions with other neurones, so psychiatry cannot be content to consider only the problems of the individual man but must also examine him in his social nexus. Even the types of interaction are similar in the two cases, with excitation and inhibition, conflict and co-operation. But it is too late to launch out on this sea and I shall close with two final quotations.

Human behavior is the resultant of the basic selfish drives, opposed by social education, and the altruistic ones, feebler yet but enhanced by group conditioning. Biological evolution very slowly, and social evolution very rapidly, is strengthening the latter (4, p. 115). One great problem for the future is to direct these (selfish drives), to find non-destructive outlets for them, so that they do not periodically burst their restraints, as a man loses his temper, and plunge mankind into destructive license (4, p. 117).

"Let us, with humble recognition of man's finiteness and of the possibility that increased human control of nature may lead either to good or to evil, use our intelligence, circumspectly and alertly, to do the best we can to utilize science for human welfare." And the best we can do is to apply science to the problem of its utilization. Science has already given man a "utopia of means"; it can yet give him a "utopia of ends" (4, p. 225).

In this psychiatry must play a noble rôle.

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ELECTROENCEPHALOGRAPHIC EFFECTS OF BILATERAL PREFRONTAL LOBOTOMY

COMPARISON OF CASES WITH AND WITHOUT POSTLOBOTOMY SEIZURES¹

SIDNEY LEVIN, M.D., MILTON GREENBLATT, M.D., MARIE M. HEALEY,
HARRY C. SOLOMON, M.D.

INTRODUCTION

In view of the great interest in prefrontal lobotomy as a therapeutic measure and the problems attending brain injury induced by this procedure, we are reporting EEG studies on 71 cases, including 25 with postoperative convulsive complications. The significant contributions in this field to date are summarized below.

In 1941, P. A. Davis(1) reported EEG studies on 3 patients who underwent bilateral lobotomy. In 2 of the patients EEGs taken weeks after the operation were essentially the same as those recorded prior to lobotomy. In the third, the EEG improved after operation.

In 1945, R. Cohn(2) reported the EEG findings on 30 lobotomized patients from Freeman and Watts' series. The primary response to lobotomy was the development of bilateral high amplitude slow waves about the operative site, with a tendency toward return to normal in 1 to 3 months. Some cases showed no demonstrable EEG response to lobotomy, and others developed late EEG abnormalities following recovery from the initial dysrhythmia. Hyperventilation produced slow wave activity after operation in brains that before operation were uninfluenced by this procedure. Only 1 of the 30 patients developed a convulsive seizure; in this case an EEG recorded after the seizure was grossly abnormal.

Hutton *et al.* and Walter(3) found that after lobotomy high voltage slow waves were diffuse. However, over a 6 months' follow-up period the slow waves gradually dimin-

ished and became more localized to the frontal regions.

Greville and Last(4) studied 35 cases before and at intervals up to one year after lobotomy. Following the operation, alpha activity (8-13 c.p.s.) was increased both in amount and amplitude, and fast activity (over 13 c.p.s.) was diminished. These findings were thought to reflect decreased tension and increased relaxation. Delta activity (less than 4 c.p.s.), which was present in about 57% of the cases, at first appeared all over the cortex and then became predominantly frontal with some extension to the central areas. Bipolar studies showed that the delta waves originated in front of the lobotomy incisions. Although at first random, delta activity was later paroxysmal and often strictly synchronous from the 2 hemispheres. Theta activity (4-7 c.p.s.), which was more common and more sustained than delta activity, was widespread with a tendency toward frontal domination, but without clear localization.

Stevens and Mosovich (1947) reported clinical and EEG studies in 30 patients followed for more than 6 months after lobotomy(5). Of the 10 cases with post-lobotomy seizures, 6 had received shock therapy prior to operation, whereas of the remaining 20 patients who were seizure-free after lobotomy only 3 had received shock therapy prior to operation. Of 24 patients who had EEGs 6 months to 8 years after operation, 23 showed definite abnormalities bilaterally over the frontal regions, and 21 of these showed bilateral delta waves. There was no correlation between postoperative behavior and EEG abnormality.

MATERIAL AND METHODS

Patients.—Seventy-one patients who underwent bilateral prefrontal lobotomy at the Boston Psychopathic Hospital were studied.

¹ From the Department of Psychiatry, Harvard Medical School, and the Boston Psychopathic Hospital, Dr. Henry C. Solomon, Director.

We are indebted to Dr. J. L. Poppen and Dr. K. Livingston of the Department of Neurosurgery of the Lahey Clinic, who performed the operations, and to Barbara Sittinger and Barbara Kimball for assistance in all phases of the research.

Because we attempted to collect cases with postlobotomy seizures for study, ours was definitely a selected² group, consisting of 25 patients who developed seizures and 46 who were free of seizures in the postlobotomy follow-up periods.

The diagnostic classifications were: dementia praecox, 49 cases; psychoneurosis, 11 cases; manic-depressive psychosis, 3 cases; involutional psychosis, 3 cases; paranoid condition, 2 cases; undiagnosed psychosis, 2 cases; and psychosis with cerebral arteriosclerosis, 1 case.

Before operation many of the patients had received electric shock or insulin shock therapy, or both, with little or no sustained improvement.

The ages ranged from 14 to 67 years; most of the cases were between 20 and 40 years of age.

Operation.—In all cases a bilateral prefrontal lobotomy was performed according to the Lyster-Poppen technique(6), which consists of a superior approach (trephine openings 4 cm. anterior to the coronal suture and 4 cm. lateral to the midline), removal of cores of brain tissue bilaterally, and extension of the lobotomy incisions laterally and medially in each hemisphere under complete visualization. In this operation, the plane of section passes just in front of the anterior horn of the lateral ventricle and ends inferiorly at the border of the sphenoid ridge.

Recording and Classification of EEGs.—The EEGs were recorded by means of a Grass six channel apparatus, with electrodes applied in standard positions on the scalp both anterior and posterior to the plane of section, and with additional electrodes applied over the plane of section. All the major cortical areas (frontal, precentral, parietal, occipital, and temporal) were represented. Hyperventilation was carried out whenever the patient cooperated for this procedure. The circuits generally were made by linkages from scalp to interconnected ears; however, scalp to scalp linkages were also used when deemed advisable.

² The degree of selection is indicated by the fact that the incidence of convulsive complications in our total series of over 400 lobotomized cases was around 10%.

The EEGs were classified on a 1-to-5 scale according to an adaptation of the Davis system which has been previously published (7-9). Tracings were also classified according to the Gibbs-Lennox scale(10) with attention to paroxysmal features, focal abnormalities, and reactions to overbreathing.

In many cases repeated tests were done at intervals after lobotomy. A total of 254 EEGs were recorded on the 71 cases. The duration of EEG follow-up after lobotomy varied from a few days to 3 years.

RESULTS

A. Prelobotomy EEGs

(1) *Comparison of Cases with and without Postlobotomy Seizures.*—Two groups of cases, similar in distribution of age and clinical diagnosis, were contrasted. The one had seizures at some time after lobotomy (seizure group) and the other was free of seizures after lobotomy (seizure-free group). Of 25 patients belonging to the seizure group 18 had prelobotomy EEGs, 6 of which were abnormal (33%). Of the 46 cases belonging to the seizure-free group, all had prelobotomy EEGs, 11 of which were abnormal (24%).

In comparing the abnormal prelobotomy EEG patterns in the 2 groups, more slow dysrhythmia was found in the seizure group and more fast dysrhythmia in the seizure-free group. Of the 7 cases with fast dysrhythmia in the seizure-free group, 4 had very fast activity (F_2). However, none of the seizure group had F_2 dysrhythmia in the prelobotomy EEGs. This trend may be significant but should be checked in a larger series of cases.

In the seizure cases, no relationship was observed between frequency of seizures after lobotomy and abnormality of the prelobotomy EEG. In other words, an abnormal prelobotomy EEG did not presage a more severe convulsive state if seizures followed lobotomy. Two of the cases with seizures after lobotomy had a history of convulsions prior to lobotomy—one in infancy and one in adult life. Both had abnormal pre- and postlobotomy EEGs.

(2) *Significance of Shock Treatment before Lobotomy.*—The majority of our pa-

tients had received some type of shock treatment prior to lobotomy. We compared the treatment given to the seizure group with that given to the seizure-free group. Essentially the same percentage of cases in each group (60%) had received prelobotomy electric shock or metrazol treatments. Likewise, the percentage of cases receiving insulin shock treatments was not significantly different in the two groups (25% for the seizure group as compared to 18% for the seizure-free group). However, for cases who had received electric shock therapy, the average number of shocks given to those who developed postlobotomy seizures was 31, as compared to 15 for individuals who remained seizure-free. This suggests that the administration of a large number of electric shock treatments before lobotomy may predispose the individual to postlobotomy seizures.

There was no significant correlation between prelobotomy EEG abnormality and a history of previous shock treatments. Abnormal prelobotomy EEGs were recorded as often in patients who had not received shock treatments as in those who had. Also, the prelobotomy EEGs were apparently unaffected by the number of shock treatments. These findings are explained by the fact that the prelobotomy EEGs were recorded long after termination of shock treatments, at a time when the dysrhythmic effects of shock had apparently subsided. The predisposition to postlobotomy seizures in those who received many electric shocks is, therefore, not reflected in the prelobotomy EEG if sufficient time is allowed for recovery from the acute effects of the treatments.

These findings confirm and amplify the report of Stevens and Mosovich(5), who found that more of their seizure cases had received shock treatments before lobotomy than had their seizure-free cases. Freeman (11), too, found a connection between preoperative shock treatment and seizures after lobotomy, for there was a higher incidence of cases with postlobotomy seizures in his shocked group than in his unshocked group.

B. Postlobotomy EEGs

(1) *Akinetic State Immediately Following Lobotomy.* Almost all patients have shown

immediately after lobotomy a period of marked reduction in spontaneous movements lasting several days. During this phase the face is relaxed, the eyes often closed, respirations are quiet, and the patient may remain motionless for hours. With stimulation the patient is promptly aroused to momentary alertness and to physical movements only to lapse when the stimulus is removed. During this period the patient is abnormally reactive to superficial stimuli, demonstrating active forceful withdrawal of the extremity when a pin is applied to the sole of the foot, and resisting bitterly venipuncture, hypodermics, and even application or removal of scalp electrodes(12).

The EEG during this akinetic state demonstrates diffuse slow activity with frontal derivatives showing more marked slowing (S_2 and S_3) than motor and occipital derivatives (S_1 and S_2). The presence of spindles and the prompt appearance of alpha rhythm in the occipital areas when the patient is aroused by sensory stimulation, stimulating drugs, or conscious effort suggests that this slow pattern is related to sleep. The "arousal" is accompanied by sudden alteration in the occipital pattern but little or no change in the irregular rolling slow activity in the frontal areas. As the akinetic state gradually subsides and a state of more normal alertness develops, the occipital slow waves are replaced by normal alpha rhythm, but the frontal slow activity persists for a longer period of time.

(2) *Comparison of Gross EEG Findings before and One Month or More after Lobotomy.*—In studying the changes produced by lobotomy we compared the EEGs of the same cases before and after operation. There were 44 cases (18 seizure cases and 26 seizure-free cases) with EEGs both before lobotomy and one month or more after lobotomy.³

Fig. 1 shows that a much higher percentage of abnormal EEGs appeared after lobotomy in the seizure group than in the seizure-free group (76% as compared to 38%). Fig. 2 shows that a much higher percentage of focal EEGs appeared after

³ EEGs taken less than one month after lobotomy were not used in these comparisons in order to exclude early postoperative effects.

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lobotomy in the seizure group than in the seizure-free group (41% as compared to 12%). It is apparent that although both groups may develop nonfocal or focal abnormalities after lobotomy, there is a strikingly greater incidence of both types of dysrhythmia in the seizure cases.

In 3 of the seizure cases with focal EEGs we have had the opportunity to observe by serial studies the development of the focus between the first and sixth months after lobotomy, prior to the development of seizures. The data suggest that the appearance

anterior to the cut, but prominent abnormalities were also noted from leads placed at the edge of the bone button (overlying the cut), and from precentral, motor, and anterior temporal placements. In some instances, abnormalities extended further backward, but with markedly diminishing intensity. A strongly dominant occipital alpha rhythm was usually preserved, although it was frequently of increased amplitude and often at a rate of 1 or 2 cycles per second slower than before lobotomy. When over-breathing could be done satisfactorily fol-

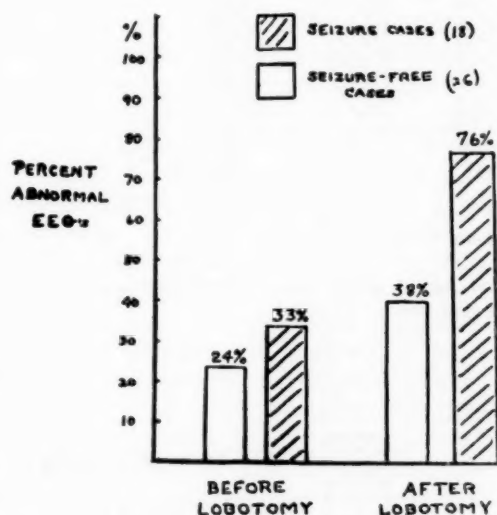


FIG. 1.—Percentage of abnormal EEGs before lobotomy and 1 month or more after lobotomy in 18 seizure cases as compared to 26 seizure-free cases.

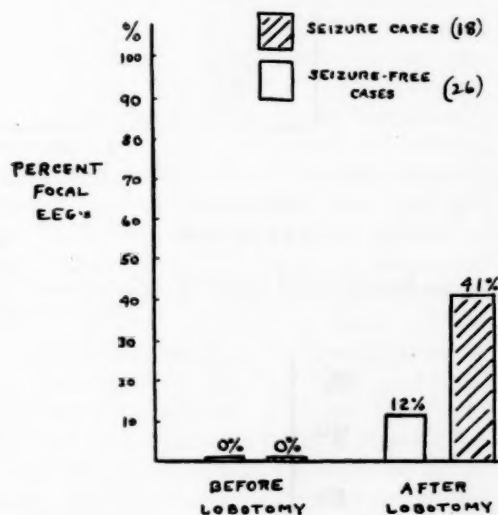


FIG. 2.—Percentage of abnormal focal EEGs before lobotomy and 1 month or more after lobotomy in 18 seizure cases as compared to 26 seizure-free cases.

of a focal EEG after lobotomy may herald the approach of a convulsive disorder.

(3) *EEG Changes after Lobotomy.*—In both the seizure and seizure-free cases lobotomy usually produced a great deal of slow activity which was at first widespread and then tended to concentrate anteriorly or to be lateralized or focally accentuated in one frontal area. Abnormal tracings were conspicuous for the large amount of slow activity (S_1 and S_2) and relatively little fast activity (F_1 and F_2). A rolling type of slow dysrhythmia of $\frac{1}{2}$ - to 3-per-second frequency with a superimposed irregular normal or fast rhythm was frequently recorded from the frontal derivatives. The most pronounced abnormalities appeared from leads placed

lowing lobotomy, the response was usually more pronounced than before lobotomy and was frequently sufficiently marked to be classified as a "big build-up." Frontal spikes were noted in only 2 cases, both of which belonged to the seizure group.

The essential difference between the seizure and the seizure-free patients was that in the seizure-free group EEG abnormalities usually began to subside between the second and fourth weeks after lobotomy, whereas in the seizure group dysrhythmias and focal abnormalities tended to persist.

Figs. 3 and 4 summarize our knowledge concerning the EEG changes at different intervals after lobotomy in the seizure-free group. In both of these figures calculations

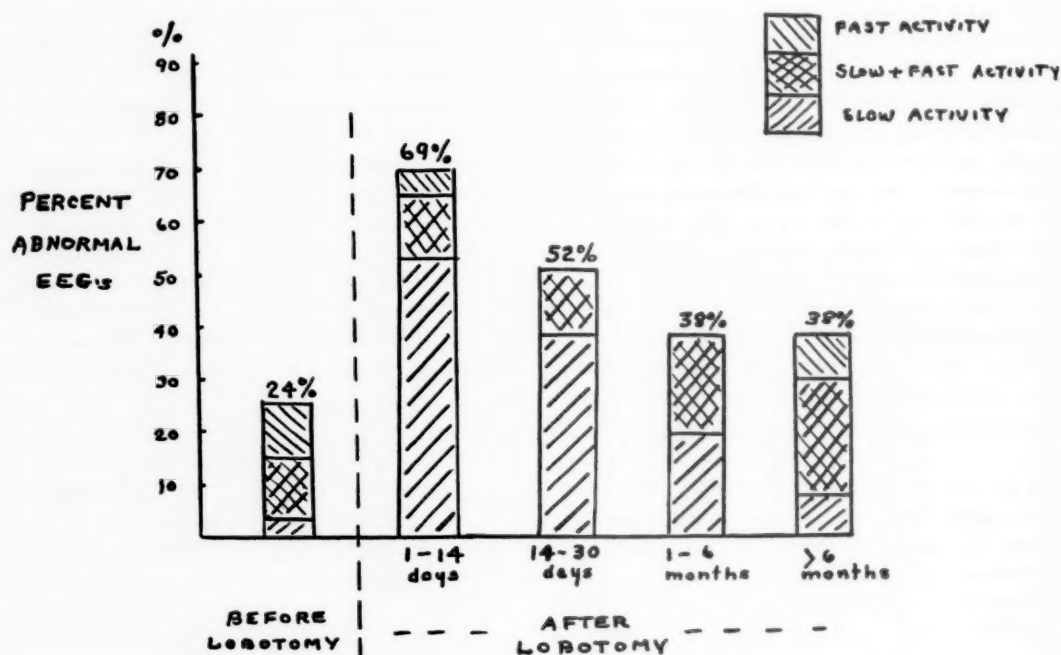


FIG. 3.—Percentage of abnormal EEGs (fast, slow, and mixed types) at different intervals after lobotomy in seizure-free cases.

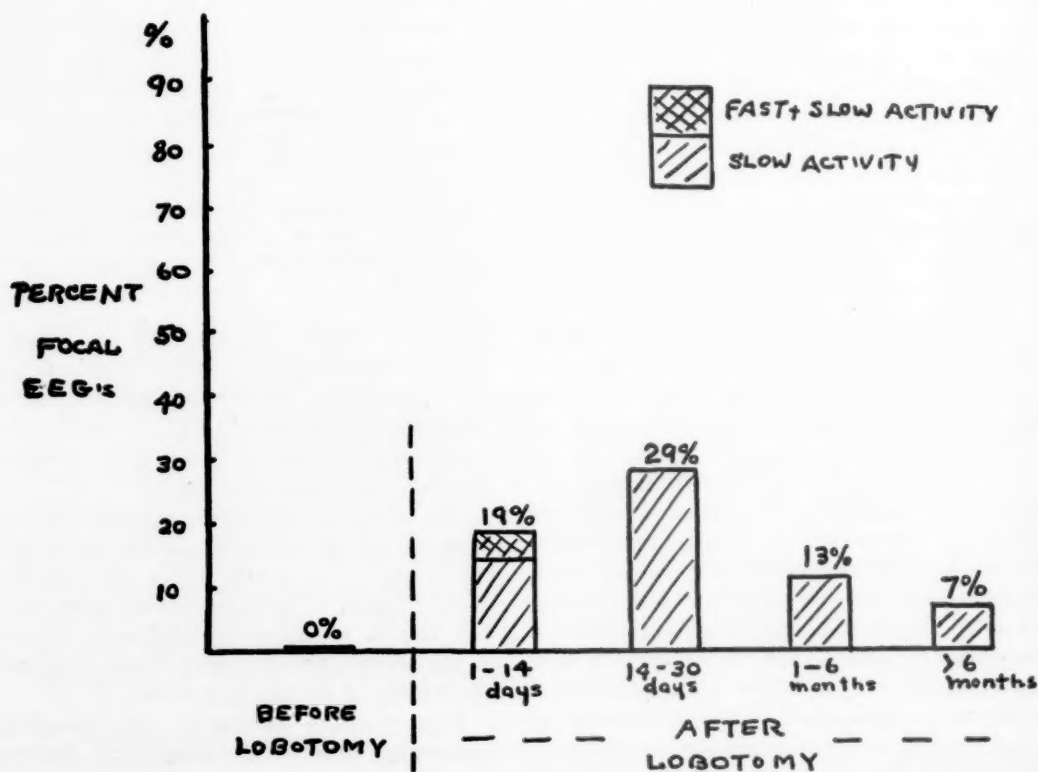


FIG. 4.—Percentage of abnormal focal EEGs at different intervals after lobotomy in seizure-free cases.

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are based upon the following number of cases: 46 cases studied before lobotomy, 26 cases studied 1 to 14 days after lobotomy, 21 cases studied 14 to 30 days after lobotomy, 16 cases studied 1 to 6 months after lobotomy, and 16 cases studied more than 6 months after lobotomy.

Fig. 3 shows that, in the first 2 weeks after lobotomy, a large majority of cases (69%) demonstrated abnormalities many of which later subsided, reaching a low point (38%) at 1-6 months. Slow wave activity was at its height immediately after lobotomy and declined steadily thereafter. Fast activity, which was mixed with slow activity in a small proportion of cases immediately after lobotomy, gradually increased in prominence with the passage of time. A few rare cases eventually showed only fast dysrhythmia; these were the patients whose prelobotomy EEGs were dominated by fast dysrhythmia. In other words, slow wave dysrhythmia after lobotomy obscured most of the fast components for a while.

Fig. 4 shows that the focal abnormalities which occurred in seizure-free cases after lobotomy were most prominent between 14 and 30 days after lobotomy and then began to subside. It is noteworthy that all focal cases except one had slow dysrhythmia and that this case combined slow with fast dysrhythmia in the focal area.

In connection with Figs. 3 and 4 it would have been desirable to examine the identical group of cases throughout, but unfortunately this was not feasible. However, analysis of 29 seizure-free cases, on whom we had 2 to 6 repeated EEG studies after lobotomy, bears out the above findings. In 15 of the 29 cases, the EEG trend was toward improvement; in 7 the EEG picture remained unchanged; and in 7 the trend was toward a more abnormal EEG. One follows with particular interest those patients with progressing abnormality of the EEG, for it is possible that they will eventually develop convulsive complications. A breakdown of the variety of trends noted after lobotomy emphasizes that the EEG changes were complex and individualized. Prefrontal lobotomy produced a rich assortment of changing cerebral dysrhythmias. All the above observations were consistent with known

electrical reactions of severely damaged tissues. The most striking over-all phenomena were as follows:

(1) There was a high incidence of very slow rolling activity in frontal, precentral, and to a less extent in motor and temporal leads. This rolling effect resembles eye movement artefact but we believe it can be distinguished therefrom. It appears to be characteristic of the response of the brain to prefrontal lobotomy.

(2) There was a predominance of slow wave abnormalities and a relative infrequency of spike dysrhythmia in postlobotomy EEGs. This held true not only for records made immediately after operation but also for records made months after lobotomy. In view of the cortical damage incident to lobotomy and the probability of cortical scarring especially in cases with postlobotomy seizures, we were impressed with the fact that our cases showed so little spike dysrhythmia of the type reported by Jasper and others (13, 14) for cases with epileptogenic cortical scars. However, because of the massive undercutting of the subcortical areas, the brain damage resulting from prefrontal lobotomy is obviously different from that involved in a traumatic cortical cicatrix.

(3) There was a high incidence of asymmetry and focal abnormality, although the surgeon attempted to do equal amounts of damage to the two sides. This observation is consistent with the neuropathological findings of asymmetrical brain damage after bilateral prefrontal lobotomy (15-18).

(4) *Correlation of Clinical and EEG Data in Patients with Postlobotomy Seizures.*—In the 25 patients who developed postlobotomy seizures we determined the lapse of time between lobotomy and the first seizure. The data are summarized in Table 1. Although the maximum number of cases developed seizures between 3 months and 1 year after lobotomy, in some cases seizures developed within days after the operation, and a few cases were seizure-free until a year or more had elapsed. With longer follow-up, it may be expected that more so-called "seizure-free" cases will develop seizures and that such cases will be derived primarily from those who now demonstrate a focal dysrhythmia.

Concerning the number of postlobotomy seizures in each case, it is impossible to give data which are comparable for all patients because of the differences in follow-up time. However, the number of seizures recorded per patient varied greatly, from a single seizure to many seizures and even to periods of status epilepticus (see Table 2).

The foregoing table (2) demonstrates that, although most of the patients have few sei-

TABLE 1

INTERVAL BETWEEN LOBOTOMY AND FIRST SEIZURE
IN PATIENTS WHO HAVE DEVELOPED POST-
LOBOTOMY SEIZURES

Time interval	Number of cases
1-30 days	4
1-3 months	1
3-6 months	7
6-12 months	8
1-2 years	4
After 2 years.....	1
Total	25

TABLE 2

NUMBER OF SEIZURES AFTER LOBOTOMY
(25 CASES)

(Follow-up: 3 months to 4 years
Average = 1.8 years)

Number of seizures	Number of cases
1 or 2 seizures.....	13
3 to 6 seizures.....	6
6 to 12 seizures.....	1
12 to 20 seizures.....	1
"Many seizures"	2
Status epilepticus	2
Total	25

zures, there are a few whose seizures are so frequent as to constitute a serious hazard, threatening to life at times. Two of our patients died at 5 and 11 days postoperatively, immediately after convulsive seizures.

Concerning the types of seizures which the patients developed, the data are as follows (see Table 3): Twenty-one cases had grand mal seizures, 2 had Jacksonian and grand mal attacks, and 2 had attacks of rigidity. There were no cases with petit mal epilepsy (or dysrhythmia) and no instances of psychomotor epilepsy (or dysrhythmia) although one patient who suffered from postlobotomy grand mal attacks exhibited also attacks of rage suggestive of an epileptic equivalent.

The number of cases with focal EEGs who had generalized rather than Jacksonian attacks is worth noting but may be explained by the fact that the lobotomy incisions were located a considerable distance anterior to the motor strip.

Concerning the significance of the time interval between convulsive attacks and EEG recordings, the following observations were made for those patients in whom a definite time interval could be established: Of 17 EEGs taken within 2 weeks of a known seizure all were abnormal, 8 of them being classified as type 5 (the most abnormal tracings encountered); of 25 EEGs taken from 1 month to 1 year after a known seizure, 16 were abnormal and 1 was classified type 5; of 7 EEGs taken 1 to 3 years after a known seizure, 5 were abnormal and none was type 5.

TABLE 3

RELATIONSHIP OF EEG FOCI TO TYPE OF SEIZURE

Type of seizure	Number of cases	Number of abnormal EEGs	Number with focal EEGs
Grand mal only.....	21	19	5
Jacksonian seizures and grand mal.....	2	2	2
Attacks of rigidity.....	2	2	2
Total	25	23	9

These facts indicate that the EEG was more abnormal the shorter the interval between convulsions and recording of the EEG, and that the worst abnormalities were noted principally when this interval was very short. However, although a decline in the incidence of severely abnormal EEGs occurred with time, in most instances some degree of abnormality tended to persist. It cannot be said, therefore, that the EEG is abnormal only by virtue of a convulsive attack and then gradually becomes normal. Although there is a tendency for the EEG to improve after a seizure, this does not vitiate its value as a diagnostic tool in the postlobotomy convulsive disorders.

(5) *EEG Findings in Cases with Chronic Postlobotomy Headache.*—Among the more disturbing postlobotomy complications was severe chronic headache, which was a major complaint of 4 of our cases, all females. It is probably significant that these 4 cases

belonged in the group with postlobotomy seizures and that all 4 had abnormal focal EEGs. It appears that chronic postlobotomy headache is probably related to focal meningo-cortical scarring, which is so often associated with focal cerebral dysrhythmia.

C. Relation of Clinical Status after Lobotomy to Postlobotomy Seizures and EEG Findings

A follow-up study of our 71 patients was made in order to determine their clinical status. Cases were classified as to whether they were hospitalized or discharged to the community, and then as to whether the clinical condition was *good*, *fair*, or *poor*. The definition of these categories has been described in another publication(6). Briefly,

look is at least as good as for those who remain seizure-free. The data suggest the possibility that postlobotomy seizures may even favor a good clinical result, but whether this is fact or illusion remains for further experience and study to demonstrate.

There was no correlation between EEG findings before or after lobotomy and the clinical status after lobotomy. The effect of the lobotomy upon the mental disorder, therefore, could not be predicted from the EEG.

DISCUSSION

The data accumulated thus far permit us to give a description of the EEG changes after bilateral prefrontal lobotomy. Briefly, high amplitude slow waves are promptly

TABLE 4
CLINICAL OUTCOME IN SEIZURE AND SEIZURE-FREE CASES.

	No. with follow-up	Location		Condition			Expired
		Hospital	Discharged	Good	Fair	Poor	
Seizure cases	25	9	13	8	6	8	3
Seizure-free cases ...	46	21	23	7	17	20	2
Total	71	30	36	15	23	28	5

Follow-up:
 Seizure cases: 3 months to 4 years. Average 1.8 years.
 Nonseizure cases: 5 months to 4½ years. Average 2.8 years.

condition *good* indicates that the patient was free of severe mental symptoms and able to work in the community. Condition *fair* indicates that the patient was partially relieved of mental disorder, and was capable of at least part-time occupation in home or in hospital. Condition *poor* indicates that no significant change took place in the adjustment of the patient following lobotomy. A summary of the relation between clinical status and the presence or absence of postlobotomy seizures appears in Table 4.

Approximately one-half of both the seizure cases and the seizure-free cases were considered sufficiently improved to be discharged to the community. Approximately one-third of the seizure cases and slightly better than one-sixth of the seizure-free cases were considered good results from the clinical viewpoint. The results indicate that, although postlobotomy seizures may be a disturbing complication, for those who survive the convulsions the broader clinical out-

look is at least as good as for those who remain seizure-free. The data suggest the possibility that postlobotomy seizures may even favor a good clinical result, but whether this is fact or illusion remains for further experience and study to demonstrate.

There was no correlation between EEG findings before or after lobotomy and the clinical status after lobotomy. The effect of the lobotomy upon the mental disorder, therefore, could not be predicted from the EEG.

The data accumulated thus far permit us to give a description of the EEG changes after bilateral prefrontal lobotomy. Briefly, high amplitude slow waves are promptly

evoked, are more marked in the region which has been surgically traumatized, and tend to diminish over a period of weeks to months. During the drowsy-anergic phase which characterizes almost all cases just after operation, slow activity is diffuse, but when somnolence disappears, slow activity tends to be concentrated frontally, frequently with accentuation on one side. A considerable degree of frontal or focal abnormality may persist for months or years after lobotomy, and such abnormality is more common in patients who exhibit convulsive seizures than in patients who are seizure-free. These findings are reminiscent of those in head injury and other conditions of cerebral damage.

The EEG changes after prefrontal lobotomy are distinguished by the peculiar rolling base-line oscillations, which are especially prominent in frontal derivatives, and by the relative lack of spikes from the traumatized areas. Increased amplitude of alpha rhythm and excessive response to over-

breathing are also frequent EEG findings after lobotomy.

Although some light has been cast upon the factors determining postlobotomy seizures, perhaps as many questions have been raised as have been answered. It would appear from our data that it is not easy to predict from the prelobotomy EEG which patients will develop postlobotomy seizures. However, there is evidence that a large number of shock treatments before lobotomy predisposes somewhat to postlobotomy seizures.

Kalinowsky and Hoch(19), in summarizing the literature on the question of brain damage resulting from electric shock therapy, state that although such treatment produces a temporary dysfunction of brain tissue as evidenced by psychologic and electroencephalographic changes, the dysfunction is evidently temporary, and no neuropathological changes occur which would explain a lasting disturbance of brain function.

In the present study, no significant differences in the prelobotomy EEGs were noted between those who received electric shock treatments and those who did not; nor between those who received a few and those who received many treatments. These observations are explained by the fact that the prelobotomy tracings were recorded months or years after completion of electric shock treatments. Our findings are consistent with the reports of others that the dysrhythmia produced by electric shock is highly reversible(20, 21). However, there are indications that some form of cerebral dysfunction may persist long after the EEG changes produced by electric shock have subsided, for in the series of Stevens and Mosovich(5), of Freeman(11), as well as our own, more shock treatment had been given before lobotomy to those patients who developed postlobotomy seizures than to those who remained seizure-free. It appears that a predisposition to seizures may be induced by many electric shock treatments, and that, although this predisposition may not be reflected in the prelobotomy EEG, it may be brought to the surface by the extensive operative trauma of prefrontal lobotomy.

Although prelobotomy electric shock therapy is of some importance, it is apparent that

the surgical trauma itself is the most significant factor in the etiology of postlobotomy seizures. However, since some cases with abnormal or focal EEGs after lobotomy escape convulsive complications whereas others with normal EEGs have seizures, further analysis of the factors responsible for postlobotomy seizures is indicated. As yet unanalyzed is the relationship between postoperative seizures and such predisposition to seizures as may be determined by a careful review of the family history. Another possibly fruitful area would be a study of the relation between postlobotomy seizures and the plane of section, the extent of brain damage, and the severity of the postoperative course. Data from the neuropathological studies of Meyer, Beck, McLardy(15-17), Freeman and Watts(18), and Yakovlev(22) indicate clearly that there is often a great discrepancy between the intended and the actual damage inflicted by the surgeon, and in our study we have seen how lateralized abnormalities often appear postoperatively in one hemisphere, although both hemispheres were presumably dealt with similarly.

If 1 in 10 is to fall victim to postlobotomy seizures(6), and a share of the remainder is to suffer persisting dysrhythmias with presumed lowering of threshold against seizures—then we are surely dealing with a disturbing complication of a "therapeutic" operation, a complication which should be carefully weighed in all cases prior to advising this operation. Included also should be the considerations that, although postlobotomy seizures are usually infrequent, they may occur at almost any time postoperatively and may possibly be dangerous to life. Furthermore, not every postlobotomy seizure case responds readily to anticonvulsant medication.

On the other hand, to soften the blow of the postoperative fit, there is the knowledge that seizures do not retard the favorable effect of the lobotomy upon the mental disorder.

SUMMARY

(1) A selected group of 25 chronic psychiatric cases who manifested seizures after lobotomy and 46 chronic psychiatric cases

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who were seizure-free after lobotomy were studied clinically and electroencephalographically.

(2) An analysis of the prelobotomy EEGs of the seizure and seizure-free group revealed only slightly increased abnormality in the seizure group (33% as compared to 24%), more slow dysrhythmia in the seizure group, and more fast dysrhythmia in the seizure-free group.

(3) Considering only the cases who had electric shock treatments before lobotomy, those in the seizure group averaged approximately twice as many treatments as those in the seizure-free group (31 as compared to 15). However, the difference in amount of shock treatments given to the 2 groups was not reflected in the prelobotomy EEGs.

(4) Immediately after lobotomy almost all patients exhibited a drowsy akinetic state accompanied by diffuse slow potentials of increased amplitude. When the patients were aroused by means of various types of stimuli, the slow waves in the posterior leads were temporarily replaced by alpha rhythm, but slow activity in the anterior leads remained. As the akinetic state gradually subsided, the occipital slow waves were replaced by normal alpha rhythm, but the frontal slow activity persisted for a longer period of time.

(5) Following lobotomy, there was an extremely high incidence of very slow "rolling activity" which was observed in frontal, precentral, and to a lesser extent in motor and temporal leads.

(6) Slow activity from leads about the injured area was at its height within the first 2 weeks after lobotomy and then began to decline. This decline was well marked in the seizure-free cases, but in the seizure cases slow wave abnormality tended to persist.

(7) One month or more after lobotomy the incidence of abnormal EEGs was much higher in seizure cases than in seizure-free cases (76% as compared to 38%).

(8) One month or more after lobotomy the incidence of focal EEGs was much higher in seizure cases than in seizure-free cases (41% as compared to 12%).

(9) EEG abnormality in the seizure cases was in part dependent upon the interval between the seizure and the recording of the

EEG. When the interval was short (days), the EEG was usually more abnormal than when the interval was long (months or years). However, the majority of EEGs recorded more than one year after a seizure were still abnormal.

(10) Clinical analysis of cases with postlobotomy seizures revealed the following:

(a) The interval between lobotomy and onset of seizures varied from days to years, with a peak at 3 months to 1 year.

(b) During a follow-up period varying from 3 months to 4 years, the majority of patients experienced only 1 or 2 seizures. However, some patients had frequent convulsions, and status epilepticus occurred in 2 cases.

(c) In the large majority of cases, attacks were of the grand mal type. Two patients had Jacksonian seizures in addition to grand mal, and 2 patients had tonic seizures. No petit mal or psychomotor seizures were observed.

(11) Postlobotomy seizures did not negate the beneficial effect of lobotomy upon the mental disorder. The clinical follow-up study after lobotomy revealed that the seizure cases were doing as well as, or better than, the seizure-free cases.

(12) There was no correlation between EEG findings (either before or after lobotomy) and the beneficial effect of lobotomy upon the mental disorder.

(13) There were 4 patients with severe chronic postlobotomy headaches, all of whom had abnormal focal EEGs in addition to postlobotomy seizures.

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ANALYSIS OF MORTALITY AND CAUSES OF DEATH IN A MENTAL HOSPITAL ¹

HERMAN JOSEPHY, M.D., CHICAGO, ILL.

Many statistical data on mortality and causes of death are available for mental institutions in general. The "Report of Statistician," edited by the Dept. of Public Welfare, and the "Annual Report of the Dept. of Public Welfare" offer a wealth of material for the State of Illinois. Throughout the United States, publications by the Federal Bureau of Statistics supply ample data. However, such reports as a rule cover a large or a very large number of hospitals as a kind of homogenous unit; detailed studies covering one hospital only have hardly been published.

Therefore it seemed to be worth while to attempt an analysis of mortality and causes of death in a given institution. I took up this topic for the Chicago State Hospital, which is a large state institution close to a large city. Facts gathered here may be representative for similar hospitals, although apparently small differences—*e. g.*, in admission procedures in different states or in the chance of transferring patients to other institutions—may cause considerable changes in the mortality rate and also in the causes of death.

I have chosen two periods for comparison: namely, the years 1935 to 1937 and the years 1945 to 1947. I have checked up available data and have tried to evaluate them.

Chicago State Hospital had 4,670 patients in 1935 (June 30), 4,545 in 1936, and 4,724 in 1937. The figures for 1945 to 1947 are 4,581, 4,676 and 4,801 respectively.

A survey of the admissions ² for these years reveals some interesting facts (Table 1).

The number of admissions of patients up to 69 years of age did not change very much in 1945/47 as compared with 1935/37.

However, in the old age group—those being 70 and more years old—there were twice and more than twice as many admissions in 1945/47 as in 1935/37. The increase in the total number of admissions from 1935/37 to 1945/47 is actually caused by an increased influx of old-agers, that is, by cases of senile psychoses.³

The figures for octogenarians and nonagenarians are still more impressive; around 100 of each sex were admitted in 1935/37 as compared with 270 and 285 in 1945/47. Patients admitted in their eighth and ninth

TABLE 1
ALL ADMISSIONS, 1935/37 AND 1945/47

Adm. age	1935/37		1945/47	
	m	f	m	f
39 and less.....	794	697	763	751
40 to 69.....	1,295	929	1,237	910
70 and more.....	388	335	802	660
Total	2,477	1,961	2,802	2,321

decades of life usually stay in the hospital until death and an increase in the admission of such "bad risks" means an increase in the death rate.

Another point, which should be mentioned here, is the high percentage of voluntary admissions in certain age groups, especially of male patients. Almost 50% of the males between 40 and 50 years admitted in 1945/47 came as voluntaries; the percentage of female voluntaries in any age group was less than 25%. Most voluntaries are alcoholics. Very seldom a voluntary patient dies in the hospital.

³ Neil A. Dayton (*New Facts on Mental Disorders: Study of 89,190 Cases*. Springfield, 1940) finds a decreasing incidence of cases of senile dementia admitted from 1917 to 1935. It is doubtful whether this is an actual decrease or just a shift from the diagnosis "senile dementia" to that of "psychosis with cerebral arteriosclerosis." My experience from autopsies indicates that there is a tendency to diagnose "psychosis with cerebral arteriosclerosis" too often and "senile dementia" too seldom. Anyhow, by grouping admissions and deaths according to age this pitfall may be avoided.

¹ From the Chicago State Hospital, Chicago, Ill. Read at the annual meeting of the Illinois State Physicians Association, Chicago, May 11, 1948.

² No distinction was made between first admissions and readmissions. According to the "Report of Statistician" the average ratio in all Illinois Mental Hospitals is about 80-85% first admissions and 15-20% readmissions.

It is somewhat surprising to find that the number of deaths in Chicago State Hospital was almost identical in 1935/37 and in 1945/47: namely, 1,995 and 1,963 for each of the 3-year periods (Table 2). However, marked differences are revealed by breaking up the totals according to age groups. More than twice as many patients admitted at an age of 39 years and less died in 1935/37 as in 1945/47. Twenty-five per cent more died in the 40 to 69 years group. On the other hand, only half as many old-agers died in 1935/37 as did in 1945/47. Of course, the increased number of old

TABLE 2

ALL DEATHS IN 1935/37 AND 1945/47

Adm. age	1935/37	1945/47 ^a
39 and less.....	376	152
40 to 69.....	1,095	811
70 and more.....	524	1,000
Total	1,995	1,963

TABLE 3

ACTUAL NUMBER OF DEATHS AND NUMBER OF DEATHS AS PERCENTAGE OF ADMISSIONS, 1935 TO 1937 AND 1945 TO 1947

Year	Deaths	% of admissions
1935	631	42.4
1936	668	47.7
1937	696	45
1945	594	41.9
1946	671	40.2
1947	698	34.2

age admissions in 1945/47 plays an important rôle here. But this is not the only influential factor.

The death rate expressed in percentage of admissions for the same year has markedly decreased: namely, from an average of 45% in 1935/37 to about 37% in 1945/47 (Table 3). Patients in mental hospitals live longer nowadays than they did 10 years ago. Shock and fever treatment as well as sulpha and penicillin get the credit for that.

In Table 4 I have tabulated the "early" deaths, arbitrarily defined as those which occurred during the first month of institutionalization. The gross figures are almost identical for 1935/37 and 1945/47. How-

ever, here again differences in age groups are striking. Seventy-one patients admitted at the age up to 39 years died shortly after admission in 1935/37, and 15 only in 1945/47. The diagnosis in the death certificate, "exhaustion in the course of acute schizophrenia or catatonia," is rather common in 1935/37. It disappears almost completely in 1945/47. In the middle age group 265 patients died early in 1935/37, as compared with 164 in 1945/47. One of the reasons for this difference: in 1935/37 many patients with general paresis expired soon after admission; this did not happen very often in 1945/47.

Contrary to that, in the old age group about 130 more died early in 1945/47 than in 1935/37.

Early death of old agers sent to the hospital is frequent, of course. A detailed sta-

TABLE 4

EARLY DEATHS: THOSE OCCURRING DURING THE FIRST MONTH OF HOSPITALIZATION

Adm. age	1935/37	1945/47
39 and less.....	71	15
40 to 69.....	265	164
70 and more.....	161	298
Total	497	477

tistic shows that about 20% of the septuagenarians are dead not later than one month after admission. About 25% of the octogenarians have the same fate. The mortality rate for the second and third months of institutionalization raises the figures to about 40%. In other words, out of 100 seniles admitted in January and February of a year, 60 only are still alive in June. The prognosis for this group has somewhat, but not much, improved in 1945/47 as compared with 1935/37. Comargo and Preston⁴ have found a similar situation in the Maryland institutions for the period 1938/1940.

• Late deaths, arbitrarily defined as such occurring more than 6 years after admission, are listed in Table 5. Improvement

⁴ Comargo, O., and Preston, G. H. What happens to patients who are hospitalized for the first time when over sixty-five years of age. *Am. J. Psychiat.*, 102: 168, 1945.

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of life expectancy in the middle and old age group is evident for 1945/47 as compared with 1935/37. A few patients admitted as octogenarians during the 1945/47 period survived for more than 6 years and died in the second half of their nineties.

As a rule death certificates had to be consulted and to be relied upon in checking up the causes of death. In 1935/37 hardly any post-mortems were performed in Chicago State Hospital. For 1945/47 the average autopsy rate is about 16% of all deaths, rising from 7.1% in 1945 to 20.5% in 1947. This, of course, allows for a welcome control of the clinical diagnoses.

Most of the old patients are signed out as "chronic myocarditis" or "coronary sclerosis" or as "bronchopneumonia" or "hypostatic pneumonia." The mental diagnosis, except in cases of old schizophrenia, varies

As for the brain pathology, the senile brain with or without gross shrinkage, but usually with many plaques and Alzheimer fibrils seen upon microscopic examination, is the most frequent finding. Next in frequency are vascular lesions, as small or large softening or numerous small scars. However, massive hemorrhages are rare in our material.

Causes of death are more variegated in the rather small group of patients who die before they can be called senile. General paresis, pulmonary tuberculosis, and malignancies have to be mentioned first. Furthermore, there are some cardiacs, some diabetics, some lobar pneumonias, and some kidney cases. There are organic brain diseases, as disseminated sclerosis and chorea Huntington. Primary brain tumors are rare; 3 only were seen in 311 autopsies. Secondary brain tumors are more frequent. In 1935/37 a

TABLE 5

LATE DEATHS: THOSE OCCURRING MORE THAN SIX YEARS AFTER HOSPITALIZATION

Adm. age	1935/37	1945/47
39 and less.....	90	94
40 to 69.....	138	227
70 and more.....	9	37
Total	237	358

between senile dementia and psychosis with cerebral arteriosclerosis. Autopsies confirm the diagnosis in so far as there is usually some coronary sclerosis, some myocardial scars, and areas of bronchopneumonia or a hypostatic pneumonia. But there is also a senile brain—more often than a brain with vascular changes. Frequently this senile brain seems to be the only finding worth mentioning. I feel that it would be well to relinquish such diagnoses as coronary sclerosis or bronchopneumonia in many of these cases and to state frankly that the patient died from senility or exhaustion in the course of senile dementia. It is accepted that a general paretic may die from his brain disease; unfortunately, even a severe senile pathology of the brain seems not to be an acceptable cause of death.

There are, of course, old-agers who died from a prominent cardiac or pulmonary disease, and besides that there are the cases with malignancies, which will be discussed later.

TABLE 6

NUMBER OF PATIENTS DYING FROM CERTAIN DISEASES, 1935/37 AND 1945/47

Diagnosis (death certificate)	1935/37	1945/47
General paresis	303	131
Tuberculosis	111	101
Malignancies	49	90*
Delirium tremens	33	2

* 14 cases diagnosed by autopsy only.

considerable number of certificates state death in an epileptic attack or in a status epilepticus. This cause of death has almost disappeared, as has exhaustion in the course of acute schizophrenia.

There are some diseases, causing death, which deserve some closer scrutinizing. They are listed in Table 6. Among them general paresis is specific for mental hospitals. Less than half as many paretics died in 1945/47 as in 1935/37. This, probably, is the result of venereal disease prevention as well as of improved diagnosis and treatment. It seems not only that there is a decrease in the number of admitted paretics, but that those who become hospitalized live longer nowadays than they did 10 years ago. It should be added that the classic post-mortem and histopathological findings have become rather rare. One does not now see very often the brains with the massive infiltration and the severe damage to the parenchyma. Cases

with slight and very slight pathology, which were rare 20 years ago, are found more and more often nowadays. Sometimes it is difficult even for an experienced neuropathologist to confirm the clinical diagnosis, which was made rightfully, as history and serology prove.

- Tuberculosis has declined slightly in 1945/47 as compared with 1935/37. Anyhow a beginning of an improvement is visible. There is hope that preventive measures, especially early isolation of infectious cases, will bring further good results.

Delirium tremens has almost completely disappeared in 1945/47. I cannot decide whether this is actually so or only apparently.

Malignancies seem to have increased from 1935/37 to 1945/47. Anyhow it should be noted that of those listed for 1945/47 about 15% were missed by the clinician. As the number of old age admissions has increased, an increased number of cancer cases might be expected.

- Lucksch⁵ from Prague has recently claimed that the incidence of malignant tumors causing death in mental patients is much smaller than in the general population. I have checked up our cancer cases from the point of view of whether a patient, when admitted, had or probably had a malignant tumor or whether it may be assumed that the cancer developed during hospitalization. In the first group, admitted with or probably with malignant tumor, belong patients with diagnosed cancers and transferred to Chicago State Hospital, because brain metastases or general exhaustion made them "mental" cases, and furthermore seniles with malignancies. The second group, those developing cancer during hospitalization, contains mostly old schizophrenics. Out of the 49 patients diagnosed in 1935/37 as dying from cancer, 31 were in the institution less than one year, that is, they had the cancer when admitted. Seven were hospitalized from 1 to 6 years and 11 only more than six years. Ninety patients died from cancer in 1945/47: 56 were less than one year in the hospital, some only one or two weeks; 8 were hospitalized from 1 to 6 years and 26 only for

more than 6 years. The ratio for all deaths from malignancies to all deaths from all causes is 2.5% for 1935/37 and 4.5% for 1945/47. The ratio for late deaths (more than 6 years hospitalized) from tumor to late deaths in general is 4.6% for 1935/37 and 7.3% for 1945/47. All these figures are below that which is accepted for the general population (10 to 12%). It seems to be true that cancer occurs less frequently among mental patients than in the general population.

SUMMARY AND CONCLUSIONS

In spite of the fact that the rate of admissions to the Chicago State Hospital has increased in 1945/47 as compared with 1935/37, the number of deaths during these two periods has not increased. The death rate, expressed as percentage of admissions, has essentially declined for 1945/47.

There were more deaths of old age patients in 1945/47 than in 1935/37. This corresponds to an increased influx of senile patients.

Deaths from exhaustion in the course of acute schizophrenia have markedly decreased. The same is true for deaths from general paresis. Delirium tremens has disappeared as cause of death, at least from the Chicago State Hospital.

Malignant tumors seem to be rarer among mental patients than in the general population.

The senile patients are becoming a special problem to the hospital, as they are admitted in increased numbers. Two points should be kept in mind. A considerable percentage of these old-agers die very soon after admission. It seems justified to ask, whether these patients (who, of course, are senile psychotics) could not have died at home as well as in the hospital. It is very likely that they did not benefit from the transport from home to the Psychopathic Hospital and from there to the State Hospital. It should be emphasized that this question involves social problems, as housing shortage and care and supervision by the family. On the other hand, there are quite a number of senile patients who survive in the mental hospital for several years. It is questionable whether for all of them the mental hospital is the

⁵ Lucksch, F. Geisteskrankheit und Maligne Tumoren. Schweiz. Medizinische Wochschr., 76: 135, 1946.

right environment. The American Psychiatric Association, by setting different standards for "acute" and senile patients, has implicitly touched upon this question. In-

creased life expectancy probably will allow more and more people to live up to the age of senile dementia, and society will have to face this problem sooner or later.

EXPERIMENTAL OBSERVATIONS ON THE SO-CALLED SENILE CHANGES OF INTRACELLULAR NEUROFIBRILS¹

KARL STERN, M. D., AND K. A. C. ELLIOTT, M. D., MONTREAL

INTRODUCTION AND REVIEW OF LITERATURE

Since Alzheimer's(4, 5) and Simchowicz'(27) first description of the pathology of senile dementia the changes of the intracellular neurofibrils and the argentophile plaques have held the interest of pathologists. Indeed, Spatz(28) went so far as to assume that these two morphological characteristics must have a special significance for the process of ageing in man. He based his assumption on the fact that they are to be found almost exclusively in the ontogenetically and phylogenetically most recent areas of the central nervous system and that they cannot be found in ageing animals.

Soon after Alzheimer's discovery, however, it appeared that these changes are not as specific for senile and presenile psychoses as had been assumed. Cell changes resembling the "senile" ones were observed in diseases associated with wasting of neuron systems, *e. g.*, in the brains of cases of spastic spinal paralysis(8, 26) and in amyotrophic lateral sclerosis(30) Findings like these may have suggested the term "localized premature ageing"(12) in connection with idiopathic degenerative diseases of neuron groups; this was a revival of the classical concept of "abiotrophy" (Gowers). Such an assumption did not seem justified because neurofibrillary changes could also be seen in cases of infectious diseases of such diversity as general paresis(10, 22, 6), rabies(1), postencephalitic Parkinsonism(18), cholera(21), dysentery and intestinal tuberculosis(3). Apart from this there were other extrinsic factors which produced similar results. Reptiles during hibernation show thickening of argentophile fibres, a process which is obviously reversible(14, 29). Starvation and exposure to cold produce in animals a neurofibrillary change resembling the one described by Alzheimer in senile dementia(15). It will be noted that these last two

observations have in common the factors of decreased metabolism and low temperature. Hence, it is interesting to see that Balli(7) and Lewy(19) produced thickening and clumping of the intracellular neurofibrils in animals by thyroidectomy combined with parathyroidectomy and subsequent exposure to cold. These experiments were carried out in dogs (Balli), rabbits and monkeys (Lewy). Rasdolsky(23) in similar experiments demonstrated that the degree of neurofibrillary changes paralleled the degree of cachexia.

The data so far enumerated appear to indicate that so-called senile changes of nerve cells described by Alzheimer are not due to ageing itself but to some accidental factor concomitant with ageing(17). Nevertheless, the observations suggest that the problem of neurofibrillary changes is not only of academic importance but its investigation may give us leads in elucidating the problem of senile deterioration.

Now if one studies the literature on this subject carefully the one factor which reoccurs with greatest regularity is that of a disturbance of the basal metabolism and of the water content of the brain. Cholera, dysentery, intestinal tuberculosis, and starvation produce dehydration. After thyroidectomy and during hibernation the basal metabolism is decreased and the water content of tissues is altered. Ruzicka(25) imitated the changes of the ageing skin of tritons by starving these animals. The most conclusive experiments, however, were those by Bozler(11) who reproduced Alzheimer's winding strands of neurofibrils in the nerve cells of Rhizotoma by immersing the animals in hypertonic sea water.

Ruzicka(24) established a far-reaching theory concerning the ageing of tissues. This theory, which is largely speculative, might be referred to as the "colloidal theory of ageing." Von Braunmühl(13) elaborated a hypothesis on the senile changes of the human brain along similar lines. He imitated Bozler's ex-

¹ From the Gerontological Unit, Department of Psychiatry, and from the Department of Neurology and Neurosurgery, McGill University.

periments on neurofibrils in model experiments with fibres of rubber immersed in benzene. Although his observations seem to support the "colloidal theory," von Braunmühl was not able to produce anything like this in actual nerve cells. Alexander (2) produced argentophilia, thickening and more or less winding strands, and crumbling and destruction of intracellular neurofibrils in post-mortem experiments "by soaking fresh human brain tissue in certain fluids, such as distilled water and saline solutions." This change ("soaking change," Alexander) was, however, always accompanied by marked argentophilia of the *nuclei*, and Alexander is careful not to draw any conclusions from these results to the pathology of senescence.

On the basis of Alexander's observations one is justified to doubt the genuineness of observations on Alzheimer cells in conditions other than senile or presenile. Thus, for instance, Alexander points out that in van Bogaert's and Bertrand's (30) and Malamud and Lowenberg's (20) microphotographs argentophile nuclei can be seen. It must be kept in mind that conditions such as general paresis, postencephalitic Parkinsonism, or system diseases of neuron groups frequently terminate in cachexia and dehydration, and that we may then see something which is neither related to the basic disease nor to any factor of ageing of tissues. In fact, from Alexander's careful studies one obtains the impression that the changes first described by Alzheimer are pathognomonic for the ageing human brain, and that all subsequent observations on other conditions were dealing with something altogether different which resembles the "senile" neurofibrillary changes only superficially.

In order to clarify this problem further, experiments were undertaken in which the water content of the brain was altered *in vivo*. A particular attempt was made, by dehydrating the brains of living animals, to reproduce the loss of weight and diminution of water concomitant with severe degrees of senile deterioration.

METHOD

All experiments were done on rabbits anaesthetized with nembutal. Shrinkage or swelling of the brain was produced by infusing either 25% glucose solution (hyper-

tonic fluid) or 0.1% glucose solution (hypotonic fluid) into the femoral vein at a rate of about 2 ml. per minute for 1 to 3 hours. To obtain consistently marked effects, the brain was exposed during the infusion. The shrinkage of the brain relative to the cranium during hypertonic infusion was grossly obvious. The brain was removed, divided midsagittally, and the percentage dry weight determined on one half while the other half was used for histological study. It can be shown that the percentage swelling (+S) or shrinkage (-S) can be calculated from the formula $S = \frac{100(P - P_1)}{P_1}$ where P is the

average percentage dry weight (21.15) of the brain of normal animals removed according to a standard procedure and P_1 is the percentage dry weight of the brain from the experimental animal. Details of the experimental production and measurement of shrinkage or swelling by the above methods are given by Elliott and Jasper (16). Since the moisture content of normal brain shows considerable variation, calculated volume changes of less than 4% cannot be considered definitely abnormal.

In one case (P5-192) an edematous brain was studied from an animal which had not been subjected to infusion but had been left for two days with the muscle and scalp sewn over a large skull defect.

One hemisphere was used for histological studies. The cut comprised a coronal section through the cortex (including the entire brain at the level of the infundibulum, temporal lobe, and hippocampus) and the basal ganglia. One block was used for frozen section methods and the adjoining block for imbedding in paraffin. In those experiments in which a part of the brain was exposed one cut was made through the exposed and another cut through the unexposed part.

The sections were stained with Nissl, hæmatoxylin-van Gieson, PTA, Bielschowsky, von Braunmühl, Spielmeyer's myelin stain, gold sublimate astrocyte stain (Cajal-Globus), microglia stain (Hortega), oligodendroglia stain (Penfield), and scharlach R.

RESULTS

Table I summarizes the material studied, with the degree of change in brain volume indicated.

Instead of describing the sections separately, the findings can be summarized as follows.

Shrinking Experiments.—In Bielschowsky stains in most areas of the cortex the axones are stained as smooth uninterrupted fibres. Most nerve cells show a well-preserved shape. The nerve cell nuclei show as bright vesicles with a nucleolus. In many nerve cells no intracellular fibres are stained but there is some argentophile material, diffuse or finely granular, occupying the cell body.

In several medium power fields, however, one can detect nerve cells in clusters or irregularly interspersed which have a different

of the grey matter the axones are irregularly beaded or even fragmented. Of the nerve cells only a round or ovoid blob is stained almost solidly with silver. This seems to correspond to the nucleus. In other areas the nucleus is stained in dustlike or heavy granules, and the nucleolus can just be discerned. The areas of very argentophile cells seen in the Bielschowsky stain can also be seen here but in this stain the same types of nerve cells are characterized by solid silhouettes which can be seen at some distance from the cell body. There are areas in which the silver has precipitated to form a dustlike background, diffuse or in small clusters.

TABLE 1
TREATMENT AND SWELLING OR SHRINKAGE PRODUCED

Rabbit No.	Treatment		Estimated swelling (+) or shrinkage (-) %
P5-207	No infusion	Skull intact	+ 1
P5-210	No infusion	Skull intact	- 1
P5-188	No infusion	Skull intact	0
P5-182	Hypotonic infusion 70 mins.	Skull intact	+ 0.5
P5-194	Hypotonic infusion 80 mins.	Skull intact	+ 6.5
P5-187	Hypotonic infusion 65 mins.	Brain exposed	+ 10
P5-180	Hypertonic infusion 60 mins.	Skull intact	- 3
P5-185	Hypertonic infusion 70 mins.	Brain exposed	- 8
P6-20	Hypertonic infusion 120 mins.	Brain exposed	- 31
P5-192	No infusion	Skull defect for 2 days	+ 6.5

appearance. They show well-stained intracellular neurofibrils which can be followed over a considerable distance into the neurites and dendrites, particularly into the apical dendrite. In most of these nerve cells the intracellular fibrils are heavily impregnated and coarse, and in some they are clumped together to form heavy strands (Fig. 1). No coiling is seen but a picture imitating coils is obtained in those nerve cells which are round and in which neurofibrils seem to be forming a heavy ring (Figs. 2 and 3). The nerve cells of the fascia dentata of the cornu Ammonis are stained heavily black. The nerve cells of the basal ganglia are the same as the majority in the cortex, only that the argentophile material is still more granular and the nucleus less well defined.

In the von Braunmühl preparations the picture differs considerably from the one in the Bielschowsky stain. In most areas

The protoplasmic astrocytes (gold sublimate) show only shadows of nuclei. The fibrous astrocytes are fairly well impregnated. Only the nuclei of oligodendroglia and of microglia are stained in specific impregnations. In Spielmeyer and in scharlach R stains there is no abnormality. There is no lipoid pigment in nerve cells. Nissl, van Gieson, and PTA stains show no abnormality.

Swelling Experiments.—In Bielschowsky preparations the nuclei of the nerve cells are stained with variable intensity, some rather deeply. The most frequently encountered picture is that of a perinuclear halo with the argentophile substance squeezed to the periphery of the cell. Some of this displaced argentophile material is clumped and fragmented (Fig. 4). In some of the larger pyramidal cells neurofibrils can be seen in the cell processes, usually with marked ar-



FIG. 1.

Dehydration Experiment.—Thickening, coarseness, and clumping together of neurofibrils (Bielschowsky).



FIG. 2.

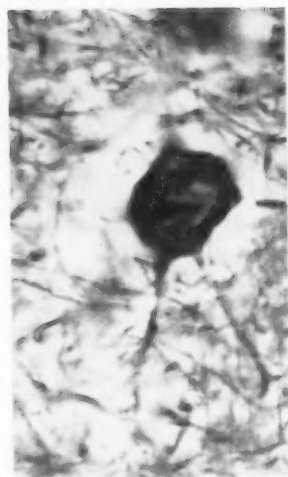


FIG. 3.

Experiments of Dehydration.—The neurofibrils are seen to be adherent to the nucleus and "tied around" the latter, as it were (Bielschowsky's silver impregnation).

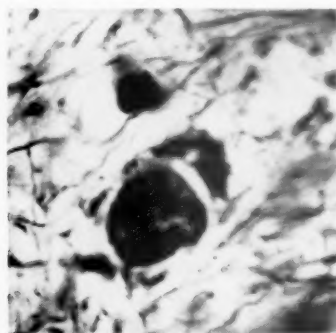


FIG. 4.

Hydration Experiment.—The neurofibrils have become argentophile material which is squeezed in amorphous clumps to the edge of the cell. Note the unstained halo between nucleus and argentophile material. This picture presents morphologically the exact opposite of what is shown in Figs. 1 and 2 (Bielschowsky's silver impregnation).

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gentophilia. However, even in these cells the intracellular argentophile material appears in heavy fragments, and not in the normal form of fibrils. No matting or formation of heavy strands can be seen anywhere. These changes are rather uniform throughout the section. The formation of a perinuclear halo can also be seen in von Braunmühl's stain. The astrocytes are swollen. The protoplasmic astrocytes of the cortex are swollen in irregular foci. The fibrous astrocytes are enlarged throughout. The oligodendroglia and microglia cells show a moderate swelling; the nuclei are heavily stained. There appears some separation and loosening of the texture of the myelinated nerve fibres within the white matter. The scharlach R stain shows no abnormality. In the Nissl stain there is some chromatolysis here and there in cells.

These changes are essentially the same regardless as to whether the brain had been exposed or left closed during the experiment. However, in the sections from exposed brains there are irregularly scattered diapedetic hemorrhages of capillaries, particularly toward the margin of the area of exposure.

DISCUSSION

We have seen that by shrinkage and dehydration of the rabbit's brain *in vivo* the morphological appearance of the intracellular neurofibrils can be characteristically changed. The fibres stain more coarsely and seem to have a tendency to become matted. This change affects nerve cells irregularly with no apparent predilection for any particular area. We could conclude from this that by rapid shrinkage and loss of water, changes which are associated with the process of ageing, we are able to reproduce what appears like an initial stage of Alzheimer's so-called senile alterations of intracellular neurofibrils.

Ever since Cajal's(14) and Tello's(29) first observations on hibernating reptiles, even before Alzheimer's discovery, it has been taken for granted that the morphology of intracellular nerve fibres is not constant, and that it varies with extracerebral factors, such as changes in temperature and water metabolism. However, if we assume that

neurofibrils are colloidal strands imbedded in a colloidal medium which is more fluid than they, it stands to reason that they would move closer together when this medium shrinks and loses water. This is even more obvious, the more one observes to what degree the arrangement of intracellular neurofibrils seems to depend on the quantitative relationship between plasma and nucleus in various types of nerve cells(9). Therefore it would be rash to conclude that we have, by shrinking, produced morphological changes which are only in degree different from those seen in the senile human brain. The fact that Bozler actually succeeded in producing winding strands by immersion of nerve cells of nonvertebrates into hypertonic seawater is so far the strongest proof that Alzheimer's cell changes are directly related to the water content of the cell, and that we have in our findings actually something corresponding to the mildest forms of senile changes in the brain. However, the fact that Alzheimer's cell changes appear to be specific for the senile pathology of the human brain, and that they have a striking predilection for phylogenetically recent areas of the nervous system makes one consider whether they present merely a quantitative exaggeration of the changes obtained in the present experiments, or whether there is another unknown mechanism present in their production. Therefore the present observations have to be interpreted with caution. If one were able to produce loss of water and "atrophy" of the brain gradually over a protracted period then the morphological results might be different.

SUMMARY

Various observations reported in the literature suggest that the so-called Alzheimer changes of the intracellular neurofibrils in senile and presenile conditions are associated with dehydration.

In the present experiments rabbits' brains were dehydrated *in vivo* by intravenous administration of 25% glucose solution. Microscopic examination showed that in some nerve cells, irregularly scattered in the brain, the intracellular argentophile fibres become coarse, and have a tendency to become matted strands. The nucleus remains intact.

These changes correspond to the initial stages of Alzheimer's cell change in man as encountered in senile and presenile conditions. These findings are discussed in the light of the literature on this subject.

The histological findings in experimental hydration are also reported.

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A COMPARISON OF THE TEST PERFORMANCES OF THE BRAIN-INJURED AND THE BRAIN-DISEASED

ROBERT M. ALLEN, PH.D.,¹ MIAMI, FLA.

INTRODUCTION

In 3 previous articles Allen(1-3) treated separately the performance of the brain-injured² and brain-diseased on form 1 of the Bellevue Intelligence Scale. The present paper will compare the test findings in both groups and review the function losses evidenced by these results.

Ruesch(6) reported dysfunctions in the brain-injured as: inability to keep up sustained effort, impairment in visual judgment and mental speed. Allen(1, 3) emphasized the following: over-all inefficiency on performance items of the Bellevue Intelligence Scale as compared with the verbal tests, a depressed general effectiveness in handling test problems, a loss in ability to shift from one item to the next, and a sensitivity to the time element in performance. The rôle of personality disturbance concomitant with brain damage, while undefined, was found to be quite effective.

Whitfield(7), working with brain-diseased, found that the personality changes in some of these patients resulted in the need for hospitalization for custodial care. Allen (3) reported that "the functions impaired by the various brain disease processes seem to differ little from those previously noted with the brain injured." There was a markedly lowered efficiency in planning ability and anticipation.

PROCEDURE

Two groups of veterans were studied over a period of approximately one year. As patients on the neurosurgical wards of a

veterans hospital they were given the Bellevue Intelligence Scale routinely. These patients were divided into the brain-injured (BI) group—50 subjects; and the brain-diseased (BD) group—36 patients. The former group ranged in age from 20 years to 55 years with the mean age at 28 years, 3 months. The brain-diseased category ranged between 20 and 54 years with the mean at 30 years, 9 months. The psychiatric and neurological diagnoses in each case were part of the permanent hospital records

TABLE 1

SUMMARY OF THE MEAN IQ DISTRIBUTION FOR THE BD-BI GROUPS, AND THEIR SIGNIFICANCE

	Full scale	Verbal	Performance
BD	99.7±2.3	103.2±2.1	95.5±2.6
BI	94.9±2.0	99.5±2.1	90.4±2.2
Diff *	4.8	3.7	5.1
CR †	1.6	1.3	1.5

* Differences between the two measures immediately above.
† Critical ratios.

TABLE 2

SUMMARY OF THE RELIABILITIES BETWEEN VERBAL AND PERFORMANCE IQ OF THE BD-BI GROUPS

	Verbal	Performance	Diff.	CR
BD	103.2	95.5	7.7	2.30
BI	99.5	90.4	9.1	2.98

and represented the conclusions based on staff conferences among the psychiatric, psychological, and social work members of the clinical team.

RESULTS

Table 1 compares the mean full scale, verbal, and performance intelligence quotients of the BI and BD groups. In addition, the significance of their differences are included.

In all 3 areas—full scale, verbal, and performance—the BD group achieved higher ratings. The critical ratios, however, do not ascribe greater than chance reliability to the differences between the means of these measures. Table 2 compares the differences between the mean verbal and performance

IQ ratings for each group. The BI group shows a more reliable difference between verbal and performance scores. In both groups, however, the variances between verbal and performance scale ratings are much better than mere chance.

An analysis was made of the mean subtest weighted scores for interest significance (between the BI and BD groups). This is presented in Table 3. None of the critical

lary, information, and comprehension on the other. There are some scattered reliable differences in the remaining subtests but they are not common to both groups.

DISCUSSION

There is little statistically to differentiate between the brain-injured and brain-diseased so far as the subtest functioning on this

TABLE 3

SUMMARY OF THE MEAN SUBTEST WEIGHTED SCORES FOR THE BD-BI GROUPS AND THEIR SIGNIFICANCE

	V*	I	C	A	DSp	S
BD	10.61±.41	11.02±.41	10.66±.49	9.63±.63	7.77±.43	9.36±.55
BI	10.2±.41	11.14±.38	10.26±.69	8.66±.55	6.68±.38	9.24±.50
Diff .....	.41	.12	.40	.97	1.09	.12
CR .....	.69	.21	.49	1.3	1.91	.16

	PA	PC	OA	BD	DSy
BD	8.16±.43	9.66±.49	8.22±.74	7.94±.44	6.94±.42
BI	8.64±.39	9.36±.44	7.60±.57	7.90±.42	6.86±.39
Diff .....	.48	.30	.62	.04	.08
CR .....	.82	.46	.66	.06	.14

* First letter of the subtests.

TABLE 4

DISTRIBUTION OF THE CRITICAL RATIOS OF THE DIFFERENCES BETWEEN THE MEAN WEIGHTED SCORES OF THE 11 SUBTESTS FOR THE BD-BI GROUPS

	V	I	C	A	DSp	S	PA	PC	OA	BD	DSy
V .....	..	.70*	.07	1.4	4.8	1.8	4.2	1.5	2.8	4.5	6.3
I	1.6†	..	.57	2.0	5.5	2.5	4.9	2.1	3.3	5.1	7.0
C .....	.07	1.1	..	1.4	4.6	1.7	3.8	1.4	2.8	4.1	5.8
A	2.1	3.7	1.8	..	2.7	.35	2.1	.04	1.5	2.4	3.8
DSp	5.7	8.3	4.5	3.0	..	2.1	.65	2.9	.53	.27	1.3
S	1.3	3.0	1.2	.78	4.1	..	1.7	.41	1.2	2.0	3.5
PA	2.5	4.1	2.1	.02	3.6	.95	..	.23	.07	2.3	2.0
PC	1.2	3.1	1.1	.99	4.6	.18	1.2	..	1.6	2.6	4.2
OA	3.4	5.1	2.9	2.1	1.3	2.1	1.5	2.8	..	.32	1.5
BD	3.6	5.7	2.9	1.1	.39	2.1	1.3	2.4	.40	..	1.6
DSy	5.3	7.7	4.3	2.8	.33	3.7	3.2	4.3	1.1	1.8	..

* The numbers in this half of the table are the critical ratios for the BD group.

† The figures in this half of the table are the critical ratios for the BI group.

ratios is high enough to be considered absolutely statistically reliable. This same information is given from a different point of view in Table 4. Each category was taken separately and the critical ratios between the various mean subtest weighted scores were computed to ascertain the interest variance-reliabilities. The significant differences for the two groups are somewhat similar. The significant differences exist between digit span, picture assembly, object assembly, picture completion, and digit symbol on the one hand and vocabu-

intelligence scale is concerned. While the BD patients did consistently better on the tests as a whole, chance factors played too important a rôle for the proper drawing of a conclusion about this. As between the verbal and performance portions of the scale, the BI subjects conformed more persistently to the pattern of doing better on the former test items. In terms of the functions involved in these tests, and their observable (or at least scorable) manifestations, a previous summarization reported by the author holds for both groups: "An ex-

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amination of the abilities tapped by these (performance tests) indicates the essential functional elements to be visual-motor coordination and cohesive organization requisite to the process of dealing with visually presented materials. The correlative abilities include analysis and synthesis of data; prolonged attention and concentration; motor speed; visual anticipation and planning" (1, pp. 228-229). A fuller discussion of the function losses and their implications for the encephalopathic person may be found in the 3 earlier papers of this series. The present analysis has little to add that has not been covered separately. However, for the purpose of comparing the BD and the BI patient in specific areas of functioning, it may be noted from Table 3 that the former excelled to some extent in 9 of the 11 subtests. It would appear that the insidious effects of a brain injury may be more adverse than a brain disease. The rationale for this lies in the province of the neurologist for the most part for probing. But the psychologist must share in the process because of the concomitant and residual personality factors involved. While it is true that the obtained critical ratios do not seem to warrant this interpretation of the differences, the author does not feel that a satisfactory qualitative picture of function and process can be obtained from the statistics.³

The discriminative value of a scatter-analysis is clearer with the BI group. For both types of patients studied the mean weighted scores of the digit span, block design, object assembly, and picture arrangement (the latter for the BD group only) are significantly discrepant from the information, vocabulary, and comprehension mean scores. The one additional function

loss or impairment that is characteristic of the BD group is that activity which is involved in picture arrangement. Allen(3) borrowed from Rapaport (5, p. 220) in his discussion of what might be involved in this subtest performance.

SUMMARY AND CONCLUSIONS

This paper is the fourth in a series dealing with encephalopathy due to brain injury and brain disease. The test results indicate that the functioning and efficiency of the patients in both groups follow a similar pattern: full scale IQ's within the normal limits, verbal scores significantly higher than performance ratings, and low inter-group differences for full scale, verbal, and performance scales. The brain-injured patients, on the average, showed more marked discrepancies between the verbal and performance subtests. The functions that are impaired or inefficient are discussed. The author holds that the statistical findings do not fully justify the quantitative interpretation that such rigid constructs as mathematical limits would imply. The effects of an encephalopathic process are serious but an unmeasurable consideration must be given to the impact upon the personality structure of the patient. It is questionable whether any statistical technique exists at present which could factor out this pervasive element satisfactorily.

A comparison of the performances of both groups on the Bellevue Intelligence Scale shows similar function losses in addition to a consistent mean subtest weighted score pattern. For those interested in designing scatter-patterns the procedure suggested previously (1, p. 230) still holds: use information weighted score as the basal point for deviation computation of the other 10 subtest weighted scores. The order of deviation of these 10 subtests from information—from most to least deviated—is: digit symbol, digit span, block design, object assembly, and picture arrangement.

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³ Scientific practice necessitates further explanation: Mathematical techniques have progressed far ahead of psychological entities. Expressions of quantitative data, however, still leave little room for qualitative interpretations beyond the limits of exact statistical values. In order to apply the knowledge from the experience gained in the process of carrying on this study there must be a tempering of the statistical findings with the behavior noted in the clinic and on the hospital wards with each type of patient. It would appear that the author is claiming that he has been more sensitive to the patients' behavior than the tests, as measuring instruments.

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A PSYCHOMETRIC DETERMINATION OF ALCOHOLIC ADDICTION

MORSE P. MANSON, PH. D.,¹ VAN NUYS, CALIF.

INTRODUCTION

Haggard and Jellinek(2) have estimated that 5.0 to 6.0% of all drinkers of alcoholic beverages in the United States are intemperate or problem drinkers. This would include from 2,000,000 to 2,400,000 individuals. Approximately 600,000 of these men and women are chronic alcoholics with marked physiological and psychological deterioration.

It is well recognized in modern medical practice that alcoholism is a disease. And it is not difficult for the practitioner or therapist to make the clinical diagnosis of alcoholic addiction. All too often, a long history of alcoholic dependency, frequent occupational shifts, psychosexual maladjustments, and increasing physical breakdowns will point to alcoholic habituation. An adequate history may be sufficient to establish a clear pattern of inebriety.

Such diagnoses, however, require clinically trained people. Furthermore, they necessitate time-consuming consultations, histories, and examinations. In large organizations, such as the military services, the Veterans Administration, state hospitals and prisons, general hospitals and clinics, the conservation of personnel and time is often of the greatest importance. If only for these economies, a brief, objective, paper-and-pencil test for the determination of alcoholic addiction would prove to be a valuable diagnostic adjuvant.

Another cogent use for such an instrument could well be the objective reinforcement of the clinical diagnosis of alcoholic addiction. Many problem drinkers stubbornly refuse to recognize their inability to cope with alcohol, although any objective observer would readily recognize the situation. In such cases, "test results" often may be helpful in facilitating insight in patients seeking assistance for "other" problems.

It is of great therapeutic importance to recognize the condition of pathological

drinking. For then total abstinence is indicated. Moderate or social drinking is contraindicated. Once the diagnosis of alcoholic addiction is made, if drinking continues, the prognosis is practically hopeless. Jellinek(3) writes: "There is unanimity among therapists that in the course of treatment (for alcohol addiction) absolute abstinence must be maintained and, with very few exceptions, therapists also agree that the patient must become a total abstainer and that he cannot be trained to become a social drinker."

There have been several studies dealing with the construction of objective tests for the determination of alcoholic addiction. Seliger(9) published a questionnaire called "The Liquor Test," containing 35 frank drinking questions, each to be answered with a "yes" or "no" response. Each question appears to be a valid item. However, in three separate descriptions of his test(9-11), Seliger does not present his experimental data, such as the numbers of subjects used, kinds of subjects, procedures used in establishing the statistical significance of test items or test scores. Neither does he present validating criteria or the reliability of the test. Any single "yes" response may be indicative of a serious drinking problem. Apparently, the responses are interpreted subjectively and empirically.

Manson(5) has constructed a test, the Manson Evaluation(6), for the psychometric differentiation of alcoholics from non-alcoholics. It contains 72 questions, *all remotely associated with drinking*, and of the type found in many objective personality tests. In a validating sample of 571 subjects, the Manson Evaluation made approximately 79% good predictions for the male group and 84% good predictions for the female group. The test has a reliability coefficient of .94. Manson described 7 personality characteristics in which alcoholics consistently made statistically significant higher scores than did the nonalcoholics. These traits were anxiety, depressive fluctuations, emotional sensitivity, feelings of resentment,

¹ Birmingham V.A. Hospital.

failure to complete social objectives, feelings of aloneness, and poor interpersonal relationships.

Manson(8) also has shown the Cornell Selectee Index, Form N, to be a valid instrument for the differentiation of alcoholics from nonalcoholics. The Cornell Selectee Index was found to make approximately 74% good predictions for males and 79% good predictions for females.

The coefficient of correlation for the Manson Evaluation and the Cornell Selectee Index, Form N, was found to be .80 for males and .77 for females.

A closely related study was that of Lentz and others(4) working with high school, college, and noncollege groups. A questionnaire containing 1,565 items of opinion, attitude, interest, preference, and practice was administered to a large group of subjects. Of the 760 who completed this questionnaire, the following categories were established: total abstainers, 28%; those who drank rarely, 29%; occasional drinkers, 29%; moderate drinkers, 13%.

From the 760 completed cases, 100 drinkers (50 men and 50 women) were compared with 200 nondrinkers (70 men and 130 women). The subjects were scored on 80 items selected from 232 items which showed as much as a 2 standard deviation difference between the drinking and non-drinking groups. This score could be considered as a measure of the degree to which an individual tends to have the personality pattern of those who drink in contrast to those who abstain from drinking. A reliability coefficient of .69, corrected by the Spearman-Brown formula, was obtained for this drinker personality test score. Lentz concluded: "The drinkers reveal more maladjustment in earlier relationships with parents, teachers, and classmates than do nondrinkers."

• The present study was made to (1) construct a valid and reliable psychometric instrument for the rapid identification of alcoholic addicts and to (2) attempt the objective recognition of the characteristics of alcoholic addicts, as revealed through the use of this test, for purposes of clarifying, to some extent, the psychodynamics underlying alcoholic addiction.

METHOD

Clinical and experimental experiences have provided a large number of observations diagnostic of the alcoholic addict. These findings have dealt with overt behavior, attitudes, feelings, developmental history, health, reasons for drinking, consistency of drinking, and other categories. From the above findings, together with a number of personal observations of alcoholics in hospitals, sanitariums, military services, government services, and at Alcoholics Anonymous groups, an initial questionnaire of 160 questions was constructed. It was administered to relatively comparable groups (comparable for age, sex, intelligence, socioeconomic level, freedom from psychoses or marked physical and mental deterioration) of alcoholics and nonalcoholics. Upon item analysis, 60 diagnostic items were selected for the final questionnaire. Each of the 60 items had a critical ratio of 2.7 or higher, for both male and female groups. Most of the items selected had critical ratios higher than 5.0.

These 60 items, called the Alcadd Test(7) (alcoholic addiction test), were administered to the groups indicated in Table 1.

TABLE 1
GROUPS TAKING THE ALCADD TEST

Groups	Males	Females	Totals
Alcoholics	83	40	123
Nonalcoholics	78	81	159
(Abstainers)	(17)	(23)	(40)
(Social drinkers) .	(61)	(58)	(119)
Totals	161	121	282

All subjects were white, literate beyond the fourth grade level, free of mental deficiency, apparently free of serious deterioration, volunteers, and from Southern California. Table 2 presents the ages of the subjects.

Alcoholic addicts were compared with social drinkers and abstainers. The addicts were chiefly secondary alcoholic addicts. Approximately two-thirds came from Alcoholics Anonymous groups and the other third from hospital patients.

The 3 groups were compared on total scores and trait scores. Critical scores were

developed and the extent of predictability of the Alcadd Test in differentiating the 3 groups was determined. Profiles of the 3 groups were developed. The reliability of the test was worked out.

RESULTS

Table 3 presents the 60 selected diagnostic questions which comprise the Alcadd Test, the critical ratios found to exist in the male (alcoholic versus nonalcoholic) and the female (alcoholic versus nonalcoholic) groups, and the classification of each question into one or more of the 5 alcoholic addiction characteristics evolved from this test. Fifty-five male nonalcoholics were compared with 87 male alcoholics, and 58 female nonalcoholics with 40 female alcoholics.

Predictability of the Alcadd Test.—Using the method described by Stead, Shartle, and associates (12) for determining critical points in a distribution of scores, critical or cutting scores were established. Such critical points can be used as norms to establish the recognition of alcoholic addiction. Since alcoholic addicts were compared with social drinkers and abstainers, and since there were marked and statistically significant differences in mean scores when the 3 groups were compared, it seems reasonable to assume that the test reveals differences pertinent to alcoholic addiction.

Table 6 shows that, with a cutting score of 12 for the male groups, only 2 individuals, or 2.4%, of the alcoholics would be incorrectly diagnosed as nonalcoholics. For the

TABLE 2
AGES OF SUBJECTS

Groups	Males				Females			
	N.	Range	Mean	S. D.	N.	Range	Mean	S. D.
Alcoholics	93 *	22-65	42.6	8.0	39	28-63	39.8	8.0
Nonalcoholics	70	19-60	38.5	10.5	80	22-66	39.5	9.9

* A number of Alcadd Test papers were incomplete and discarded, but the analysis of ages was carried through for the total groups involved.

The 5 alcoholic addiction traits were:

1. Regularity of drinking.
2. Preference for drinking over other activities.
3. Lack of controlled drinking.
4. Rationalization of drinking.
5. Excessive emotionality.

An analysis of the scores made on the Alcadd Test clearly reveal marked differences in total scores when the alcoholics are compared with the social drinkers, and also when the social drinkers are compared with the abstainers. There appear to be only slight differences when males and females within the same category are compared.

Table 4 shows the distribution of scores converted into percentages.

The differences in mean scores between the alcoholics and social drinkers is statistically significant; so are the differences between social drinkers and abstainers, but not as markedly significant. There are no significant differences between the sexes in the 3 categories. Table 5 compares the groups by their critical ratios.

social drinkers, 4 individuals, or 6.6%, would be missed; while all the abstainers would be identified as nonalcoholics. With a cutting score of 14 for the females only 1, or 2.5%, of the alcoholics would be missed; while 3, or 5.2%, of the social drinkers and none of the abstainers would be missed.

A cutting score separating the social drinkers from the abstainers was determined. No alcoholics made such a score or lower. However, 37.7% of the social drinkers in the male group and 51.7% of the female social drinkers made this score or lower. This would indicate that large percentages of social drinkers, at least in the sample used in this study, drink very little and quite often behave as abstainers in drinking situations. From a practical point of view there is little need to separate the social drinker from the abstainer. The major problem is to recognize the alcoholic addict and assist him.

The Reliability of the Alcadd Test.—Using the shorter approximation of the Richardson-Kuder formula (1), the coefficient of reliability for the male group was found to be .92; the reliability of the female

TABLE 3
60 QUESTIONS IN THE ALCADD TEST

No.	Questions	Critical ratios		Traits	Alcoholic responses
		Male	Female		
1.	I would rather go to a dinner or banquet than drink.....	3.7	14.8	2	No
2.	I have good reasons for getting drunk.....	7.5	6.7	5	Yes
3.	I need a drink or two to get started in my work.....	5.7	5.4	4	Yes
4.	I drink only to join the fun.....	5.2	8.2	4	No
5.	I drink because I am unlucky in love.....	3.9	4.1	4-5	Yes
6.	I often take a drink or two in the middle of the afternoon...	8.1	8.4	1	Yes
7.	I drink at regular times.....	7.1	4.3	1	Yes
8.	Drinking puts me at ease with people.....	5.6	4.3	4-5	Yes
9.	I would rather go to a dance than drink.....	6.8	9.5	2	No
10.	I control my drinking at all times.....	15.5	10.7	3	No
11.	Drinking speeds up life for me.....	8.1	9.4	4	Yes
12.	I drink entirely too much.....	20.7	23.2	3	Yes
13.	I prefer to dine in restaurants which serve drinks.....	5.0	6.3	2	Yes
14.	I often have the desire to take a drink or two.....	7.1	7.9	3	Yes
15.	A drink or two is the best way to get quick energy or pep...	8.6	8.3	4	Yes
16.	Drinking has changed my personality a good deal.....	11.7	12.5	5	Yes
17.	Drinking disturbs my sleep.....	7.7	11.8	5	Yes
18.	I drink to get over my feelings of inferiority.....	9.4	12.0	4-5	Yes
19.	I drink because I am unhappy or sad.....	12.5	13.0	4-5	Yes
20.	I drink about a pint or more of whiskey a week.....	5.2	2.7	1-3	Yes
21.	I drink because I like to drink and want to drink.....	3.3	4.4	2-4	Yes
22.	I would rather attend a lecture or concert than drink.....	7.4	9.0	2	No
23.	I drink much more now than five years ago.....	8.3	5.4	3	Yes
24.	Some of my best friends are heavy drinkers.....	5.9	5.9	2	Yes
25.	I drink to make life more pleasant.....	8.9	5.4	4	Yes
26.	A drink or two before a conference, interview, or social affair helps me very much.....	8.4	5.5	4-5	Yes
27.	I take a drink or two before a date.....	8.3	5.8	5	Yes
28.	I often go to a cheaper neighborhood to do my drinking.....	4.0	4.9	2	Yes
29.	I get drunk about every pay-day.....	7.9	3.5	1-3	Yes
30.	I drink because it braces me up.....	12.6	8.5	4	Yes
31.	It is necessary for some people to drink.....	5.3	3.1	4	Yes
32.	I need the friendship I find in drinking places.....	7.1	4.1	2-5	Yes
33.	I drink whenever I have the chance.....	8.8	8.3	1-2	Yes
34.	I drink to ease my pain.....	5.0	5.8	4	Yes
35.	After a few drinks, I swear easily.....	6.7	6.7	5	Yes
36.	When I am sober, I feel bored and restless.....	11.2	14.0	4	Yes
37.	I go on a bender at least once a month.....	10.8	7.4	1-3	Yes
38.	I usually pass out after I start drinking.....	6.6	4.3	3	Yes
39.	I often have blackouts when I am drinking.....	11.7	8.9	3	Yes
40.	I drink because it takes away my shyness.....	9.1	6.8	4-5	Yes
41.	I get high about once or twice a week.....	11.1	5.1	1-3	Yes
42.	I drink often at irregular times.....	10.7	8.5	1	Yes
43.	I take a drink or two when I feel happy.....	5.1	6.3	4-5	Yes
44.	I drink to relax.....	6.6	8.1	4-5	Yes
45.	I need a drink or two in the morning.....	11.3	8.4	1-3	Yes
46.	I drink to forget my sins.....	6.2	4.8	4-5	Yes
47.	I take a drink or two every day.....	9.0	5.8	1	Yes
48.	I would rather drink alone than with others.....	6.2	6.9	3-5	Yes
49.	I drink to forget my troubles.....	13.8	10.8	4-5	Yes
50.	My family thinks I drink too much.....	20.4	19.1	3	Yes
51.	I go on a week-end drunk now and then.....	13.0	11.3	1-3	Yes
52.	People who never drink are dull company.....	6.6	5.6	2	Yes
53.	My friends think I am a heavy drinker.....	14.6	10.0	3	Yes
54.	My father is (or was) a heavy drinker.....	5.5	4.6	4	Yes
55.	I would rather go to a movie than drink.....	8.8	10.8	2	No
56.	I go on a spree every few months and stay drunk for a few days.....	11.9	5.8	1-3	Yes
57.	All people who drink get drunk at some time or another....	4.3	3.6	4	Yes
58.	A spree gives me a wonderful feeling of release and freedom from worry.....	7.4	5.5	4-5	Yes
59.	I drink too fast.....	8.4	7.8	3-5	Yes
60.	I often have pleasant burning sensations in my throat.....	5.0	3.5	3	Yes

TABLE 4

SCORES ON THE ALCADD TEST CONVERTED TO PERCENTAGES

Scores	Males			Females		
	Alcoholic N-83	Social drinker N-61	Abstainer N-17	Alcoholic N-40	Social drinker N-58	Abstainer N-23
55-59	2.4	0	0	2.5	0	0
50-54	14.5	0	0	5.0	0	0
45-49	16.9	0	0	17.5	0	0
40-44	14.5	0	0	25.0	0	0
35-39	12.0	0	0	22.5	0	0
30-34	13.3	0	0	15.0	0	0
25-29	9.6	0	0	5.0	0	0
20-24	3.6	0	0	2.5	0	0
15-19	7.2	4.9	0	2.5	1.7	0
10-14	3.6	13.1	0	2.5	8.7	0
5-9	2.4	27.8	0	0	37.9	0
0-4	0	54.2	100.0	0	51.7	100.0
	100.0	100.0	100.0	100.0	100.0	100.0
Mean Score..	36.8	5.5	0.6	38.5	5.4	0.6
S. D.	12.6	.9	0.7	9.1	0.9	1.1

group was .96. The Richardson-Kuder formula always underestimates slightly the reliability of a test found by the split-half method and the Spearman-Brown formula. Therefore, the reliabilities determined with this formula are at least as reliable as found and possibly slightly higher. The reliabilities found are high and indicate dependable relationships between high scores on the Alcadd Test and alcoholic addiction, for both the male and female groups studied.

Analysis of the 60 Questions.—Subjective analysis of the 60 individual items in the Alcadd Test revealed what appeared to be 5 clusters, each composed of items probing at or measuring a common characteristic. These 5 clusters were identified as follows:

1. *Regularity of Drinking.*—This con-

TABLE 5

CRITICAL RATIOS BETWEEN GROUPS

Groups compared	Difference in mean scores	Critical ratios
Alcoholic males versus social drinker males	31.3	22.4
Alcoholic males versus abstainer males	36.2	25.9
Social males versus abstainer males	4.9	9.1
Alcoholic females versus social drinker females.....	33.1	26.9
Alcoholic females versus abstainer females	37.9	29.1
Social females versus abstainer females	4.8	8.1
Alcoholic males versus alcoholic females	1.7	0.9
Social males versus social females	0.1	0.2
Abstainer males versus abstainer females	0	0

TABLE 6

PREDICTABILITY OF THE ALCADD TEST

Groups	No.	Males Predictions				No.	Females Predictions			
		Correct		Incorrect			Correct		Incorrect	
		No.	%	No.	%		No.	%	No.	%
		(Critical score of 12) (Differentiation of alcoholic addicts)					(Critical score of 14) (Differentiation of nonalcoholics)			
Alcoholic	83	81	97.6	2	2.4	40	39	97.5	1	2.5
Soc. Drink.	61	57	93.4	4	6.6	58	55	94.8	3	5.2
Abstainer	17	17	100.0	0	0	23	23	100.0	0	0
		(Critical score of 3) (Differentiation of social drinkers from abstainers)					(Critical score of 4) (Differentiation of social drinkers from abstainers)			
Alcoholic	83	83	100.0	0	0	40	40	100.0	0	0
Soc. Drink.	61	38	62.3	23	37.7	58	28	48.3	30	51.7
Abstainer	17	17	100.0	0	0	23	22	95.6	1	4.4

tained 12 questions. They were Nos. 6, 7, 20, 29, 33, 37, 41, 42, 45, 47, 51, and 56. The alcoholic addict, usually, is a steady drinker. His regularity of drinking, as revealed in the above items, clearly sets him apart from controlled social drinkers.

2. *Preference for Drinking Over Other Activities.*—This category contained 11 items. They were Nos. 1, 9, 13, 21, 22, 24, 28, 32, 33, 52, and 55. The alcoholic is frequently an undersocialized individual who shuns social occasions. He prefers drinking over other activities, and these preferences differentiate him, in part, from the social drinker.

3. *Lack of Controlled Drinking.*—This

many more reasons for his drinking than does the social drinker.

5. *Excessive Emotionality.*—This category contained 19 questions. They were Nos. 2, 5, 8, 16, 17, 18, 19, 26, 27, 32, 35, 40, 43, 44, 46, 48, 49, 58, and 59. The alcoholic, frequently, is an immature personality with many neurotic qualities. He is often hypersensitive and has failed to develop the adjustive techniques necessary to insulate himself from competitive or frustrating situations.

In brief, it can be said that the alcoholic addict appears to be an individual who drinks regularly, prefers his drinking over

TABLE 7
COMPARATIVE SCORES ON THE FIVE TRAITS

No.	Traits	Males			Females		
		Alcoholics	Social drinkers	Abstainers	Alcoholics	Social drinkers	Abstainers
1.	Regularity of drinking						
	Mean	9.0	.4	0	6.3	.2	0
	S. D.	3.3	.6	0	2.8	.7	0
2.	Preference of drinking over other activities						
	Mean	6.9	1.6	0	6.5	1.2	0
	S. D.	3.1	1.6	0	2.6	1.2	0
3.	Lack of controlled drinking						
	Mean	12.9	1.3	.1	13.3	.7	0
	S. D.	3.9	1.1	.2	3.2	.8	0
4.	Rationalization of drinking						
	Mean	12.2	2.7	.5	13.4	2.8	.7
	S. D.	4.6	2.2	.5	3.5	2.5	.5
5.	Excessive emotionality						
	Mean	11.9	2.0	.1	13.1	1.8	.1
	S. D.	4.5	1.9	.2	3.6	2.8	.3

cluster contained 18 items. They were Nos. 10, 12, 14, 20, 23, 29, 37, 38, 39, 41, 45, 48, 50, 51, 53, 56, 59, and 60. The addict cannot stop his drinking once he starts. Each of the above items, in some way, reflects the lack of controlled drinking.

4. *Rationalization of Drinking.*—There were 23 questions in this cluster. They were Nos. 3, 4, 5, 8, 11, 15, 18, 19, 21, 25, 26, 30, 31, 34, 36, 40, 43, 44, 46, 49, 54, 57, and 58. The alcoholic addict can give many reasons for his drinking. He carries a number of superstitions about drinking. For example, he feels that "a drink or two is the best way to get quick energy" and he drinks "to make life more pleasant." From a statistical point of view, the alcoholic gives

many other social activities, drinks to excess and almost consistently loses control over his drinking, has many excuses for his drinking behavior, and shows emotional immaturity to a marked extent.

Table 7 presents the mean scores and standard deviations of the groups studied on the 5 alcoholic traits. Marked differences in mean scores will be noted when the alcoholics are compared with the social drinkers and abstainers. On every trait great differences exist.

The male alcoholics appear to be higher than the female alcoholics on regularity of drinking and preference for drinking; while the females make higher mean scores on lack of controlled drinking, rationalization, and emotionality.

SUMMARY AND CONCLUSIONS

There is a need for an objective test to identify the alcoholic addict. Such a test undoubtedly would conserve personnel and time within large screening programs. In clinical practice, such a test might be valuable as a therapeutic device.

A 60-question test, called the Alcadd Test, was constructed and used. In the present study, 123 alcoholics were compared with 159 nonalcoholics on the Alcadd Test. The 2 groups were relatively comparable in age, intelligence, and socioeconomic status. Illiterates, mental defectives, psychotics, and deteriorated individuals were not used.

The following conclusions have been drawn:

1. A paper-and-pencil test, simple to administer, score, and interpret has been found useful in the identification of the alcoholic addict.

2. Highly significant statistical differences in mean scores on this test were found to exist when alcoholics were compared with social drinkers and abstainers. Significant differences also were found when social drinkers and abstainers were compared.

3. The Alcadd Test made approximately 97% correct predictions of alcoholics and 94% correct predictions of social drinkers. It predicted 100% correctly for the abstainers.

4. Using the shorter approximation of the Richardson-Kuder formula, a coefficient of reliability of .92 was found for the males and .96 for the females.

5. A subjective analysis of the 60 items on the Alcadd Test revealed 5 characteristics of the alcoholic addict. They were as follows: (a) regularity of drinking, (b) preference for drinking over other activities, (c) lack of controlled drinking, (d) rationalization of drinking, and (e) excessive emotionality.

6. Male alcoholics appear to be more consistent drinkers and show stronger preferences for drinking than do female alcoholics. Female alcoholics show much less control over their drinking, more rationalizations for their drinking, and more emotional immaturity than male alcoholics.

7. Abstainers consistently make lower scores on the 5 alcoholic characteristics than do both alcoholics and social drinkers.

8. The Alcadd Test can be completed in less than 10 minutes and scored in 2 or 3 minutes. A profile of the 5 traits can be immediately constructed.

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ELECTRIC SHOCK TREATMENT SUCCEEDED BY COMPLETE FLACCID PARALYSIS, HALLUCINATIONS, AND SUDDEN DEATH

CASE REPORT WITH ANATOMICAL FINDINGS IN THE CENTRAL NERVOUS SYSTEM

W. RIESE,¹ M.D., AND G. S. FULTZ,² M. D., RICHMOND, VA.

The number of known fatalities after electric shock treatment, when compared with the frequency with which this treatment is now applied, is very small. The number of neuropathological studies made in these cases is still smaller. It is felt that at the present state of our knowledge more factual information is needed, before final conclusions can be reached as to the brain damage produced in human beings: its significance, its type, its degree, its relation to the electric current, the intensity and the pathway of the latter, the number of shocks given, the resulting convulsions, old age, arteriosclerosis, nutritional factors, complicating diseases, and individual susceptibility.

Limiting ourselves to the quotation of those known fatalities, in which the patients died briefly after one or two shocks, and in which histopathological examination of the central nervous system was carried out, we can only refer to two previous observations of Gralnick (1), to one of Meyer and Teare (2) and to two of Riese (3). Death occurred 2 days after the second electric shock treatment, in a 35-year-old patient of Gralnick; this patient had a cerebral vascular syphilis, and only the occasional punctiform hæmorrhages could be related to the action of the electric shock. Another patient of Gralnick, 60 years of age, died 4 days following his second treatment; post-mortem examination revealed a large meningeal fibroblastoma of the frontal fossa, mild arteriosclerotic and other vascular changes believed to be the expression of increased intracranial pressure. The perivascular spaces were markedly distended; there were also scattered small and larger hæmorrhages and finally cellular changes. The first case on record in which the patient died following a single treatment

and in which a histopathological examination of the central nervous system was carried out, was that of a 53-year-old man reported by Meyer and Teare; the patient died ca. 12 hours after shock. Post-mortem examination revealed fat embolism, but also a considerable degree of congestion of all capillaries and veins and several small petechial hæmorrhages in the mid-brain and in the frontal regions.

The two cases previously presented by Riese died very shortly after treatment; one of them 48 hours, the other only 20 minutes after the electric shock. Both patients died after a very small number of treatments; one after a single treatment, the other after two treatments. The first case was that of a 30-year-old obese and schizophrenic woman. Post-mortem examination revealed subacute cystitis, acute suppurative pyelonephritis, generalized increase in vascularization and edema of the brain, an occasional petechial hæmorrhage in the medulla, occasional fat in the wall of the vessels, which were congested, cellular changes of various types, ischemic as well as pyknotic changes being present throughout, more marked in the anterior (frontal) regions, proliferation of the oligoglia, neuronophagia. The second of Riese's cases was that of a 55-year-old depressed woman. Post-mortem examination revealed adipose infiltration of myocardium, moderate hypertrophy of heart, pulmonary arteriolar sclerosis, hypertrophic chronic gastritis, cholelithiasis and fatty liver, obesity; moderate degree of arteriosclerosis of the basal vessels of the brain, large cysts of the cavum septi pellucidi, and the ventriculus Vergæ, dilatation of the vessels, stasis and considerable enlargement of the perivascular spaces, numerous peri-capillary hæmorrhages, pigmentation and fatty degeneration of the nerve cells throughout, some of them being sclerotic, others showing ischemic changes, still others representing only "ghost

¹ Department of Neuropsychiatry, Medical College of Virginia, Department of Mental Hygiene and Hospitals, Commonwealth of Virginia.

² Tucker Hospital, Richmond, Va.

cells," small areas of necrosis, stellate and circular in shape, numerous slits and rents in the tissue, perivascular and pericellular gliosis. Nearly all the changes noted were disseminated throughout the entire central nervous system.

CASE REPORT

This is the history of a 44-year-old housewife who at the age of 2 years was thought to have had 2 or 3 "convulsions." There was no history of past illnesses, but she had always been somewhat nervous and high strung, easily excitable and irritable at times; menses had been irregular for the past 2 years. A gall bladder operation and appendectomy were performed April 1, 1947. Following operation she became depressed, self-centered, tearful on occasions, complained more than usual, was restless, and disinterested in things other than herself. After a temporary improvement she became more restless, agitated, fearful, complained of feeling excessively weak, unable to get her strength back and had no appetite.

On admission to Tucker Hospital, April 26, 1947, she was found to be somewhat obese, weight 167 pounds; blood pressure 190/110; temperature 98.2; pulse 92; respiration 20. She was quite agitated and restless. There were no unusual neurological findings; no paralysis; the pectoral, biceps, triceps, ulnar, radial, suprapatellar, patellar, hamstring, and achilles reflexes were bilaterally present, equal and normal; no clonus, all abdominal reflexes were present and active; no pyramidal tract signs, no ataxia, no tremor, speech was normal, no sensory disturbances. She could not lie in the bed or sit still for even a brief time. She constantly wrung her hands, pronounced fear of dying, cried on occasions, was somewhat resentful and demanding. At no time were there any real hallucinations. In spite of her agitation, her sensorium was clear in that she was correctly oriented as to time, place, and person. The clinical impression was that of an involutional psychosis.

Her first electroshock treatment was given on April 30, with grand mal seizure. On May 2, in the morning, she was given her second electroshock with convulsion. Of extreme interest are the nurses' notes: 1:00 p. m. "Patient sitting on floor, refuses to get up without help. Back to bed with aid of nurses." 3: p. m. "Patient out on floor again, refusing to get up without aid of nurses." 4: p. m. "Lying on floor in room." 6:00 p. m. "Down on floor again." 7:30 p. m. "Will not try to get up from floor. Voided involuntarily." Nurses' note 6:00 a. m. May 3—"Voided in bed. Patient sitting on floor, will not get up." 8:00 a. m. "Tub bath. Unable to get patient from tub. Refuses to get up without help." Patient was now beginning to get superficial bodily bruises from falling on the floor, mentally somewhat confused and disoriented; it was noted that all the deep reflexes were present and equal but hypoactive. Her abdominals remained present, but tired quite readily. She was given a

third electroshock treatment with another grand mal convulsion on May 3. Nurses' notes of the same afternoon, 4:00 p. m., "Patient lying on floor." 7:30 p. m., "Patient talking and crying, disturbing other patients." 9:30 p. m., "Still talking and disturbing." On Monday, May 5, she was given her fourth and last electroshock treatment, also with a grand mal convulsion. At 2:00 p. m., she was actively hallucinating, talking to her people at home; she frequently called the nurses and "refused" to try to move herself. She definitely was unable to move her arms and legs, talked constantly in disconnected sentences, temperature for the first time became elevated, 99.8, pulse 96. On May 6, complete neurological re-examination showed the patient to be quite flaccid. She could hardly move her arms and legs at all. There appeared to be bilateral weakness of her facial muscles. Her face was flat and much more devoid of expression. The masseters were bilaterally weak. All the deep reflexes in both upper and lower extremities were completely unobtainable. No abdominal reflexes could be elicited. No pyramidal tract signs were elicited. She definitely responded to pain, but not to light touch. Her temperature continued to go up, suddenly going to 104 several hours before her death on May 10. She became more flaccid, completely helpless, developed difficulty in swallowing, and was eventually unable to swallow at all. Respiration varied from 24 to 40 per minute.

Post-mortem examination revealed myocardial atrophy and scarring, mild subsiding hepatitis, chronic pyelitis, passive congestion of viscera, chronic cystic cervicitis, healed cholecystectomy, and moderate generalized obesity. The brain was anemic in appearance. Fragments for microscopic study were taken from almost all levels of the central nervous system, embedded in celloidin, cut and stained according to rules. Serial sections were made of each level, in some instances every section was stained (Nissl, Weil), in others every 10th. Some material was embedded in paraffin, cut and stained according to routine methods and Holzer's staining method for glia fibers. Frozen sections were made of each level and stained with Sudan III. *Fatty products* were found in the nerve cells of all levels studied. The positive reaction of the Sudan stain was particularly marked in the following gray structures: anterior horn, substantia gelatinosa Rolandi, Clarke's column, ependyma, nuclei funiculi gracilis et cuneati, nuclei of the eighth (vestibular), tenth (dors.), and twelfth cranial nerves, inferior olives, nuclei eminentiae teretis, N. raphe pontis, substantia nigra, strio-pallidum, third and first layers of the cerebral cortex. There was some fat in the wall of the vessels; the glia did not show any Sudan reaction. The Purkinje cells showed but minimal amounts of fat. *Cellular changes* in the Nissl picture were marked in the frontal regions of the cortex. They consisted of chromatolysis, reduction of the Nissl bodies, with marginal arrangement of the Nissl bodies preserved, granular or honeycombed appearance of the cytoplasm, eccentric position of the nucleus, the latter frequently being hyperchromatic. Normal cells were found side by side with abnormal ones, and there

were various degrees of the changes described in one field. Neuronophagia was obvious in the upper layers of the cortex where it does not occur under normal conditions. The perivascular spaces were found to be enlarged in celloidin embedded sections; in some instances pictures recalling cribriform state could be seen. There were some scattered areas of minute demyelination in the white matter. Finally, there were several *necrotic areas* of various shapes. One in the occipital lobe and one in the parietal region were stellate, another in area 10 was circular; all were located in the cortex. Those which could be seen in the cornu ammonis and in the deeper layers of area 4 were irregular in shape, mere rents and slits; they could be seen in all sections of the series. They occurred within an intact tissue. Those in area 4 and area 10 were associated with a disruption of the cytoarchitecture due to a displacement of the ganglion cells (those of the fifth layer in area 4 being found in the deepest part of the sixth layer), faulty orientation and cluster formations of nerve cells around the defect and in the area close to it. Petechial hæmorrhages were found in the cerebellum and spinal cord.

CLINICAL INTERPRETATION

I. PARALYSIS

Reflex changes, areflexia, hyper-reflexia, abnormal reflexes, hypertonus, and clonus during or after electric shock have been described by several authors. Recently Kaldeck (4) described a case of transient hemiplegia following electroconvulsive treatment. Though able to walk half an hour after the treatment the patient lost control of her legs about 24 hours later. Thirty-six hours after shock a left-sided spastic hemiplegia was noted which lasted about one week; it was explained by the author on the basis of a vascular spasm leading to reversible damage in the motor system of the brain. The case here presented is the second case of paralysis and the first case of tetraplegia observed after electric shock and succeeded by death.³ The patient developed a complete flaccid paralysis, the first signs of which were noted only a few hours after the second treatment when she was found sitting on the floor and unable to get up without aid. Later she had falls from which superficial bruises resulted. On examination on the fourth day after the second treatment flaccidity, motor weakness of all 4 extremities and of the face muscles, and absence of all deep and superficial re-

flexes were noted, in contrast to all examinations prior to the treatment. In both these cases the paralysis can be interpreted as a postparoxysmic one (Todd's epileptic hemiplegia). The paralysis, however, was spastic in Kaldeck's case, whereas it was flaccid in our case. Hughlings Jackson (5) considered postepileptic paralysis as an aftereffect of the excessive discharge of the nerve cells or as the result of an "overwork" of the nerve fibers, "a destruction of the function of nerve fibers (not a destruction of fibers)," or an "exhaustion by the excessive discharge in paroxysm." The aftereffect of the excessive discharges, however slight and however recoverable, was interpreted by him as a physiological condition fundamentally the same as when nerve fibers are broken up. He mentioned the discrepancies existing between the statements of various authors concerning reflex activity and clonus during the paralytic stage; he called this subject "a complicated one" and he stressed the importance of noting the condition of reflexes *instantly* on the cessation, but also at various times up to and after recovery. Since C. v. Monakow (6) we call the initial stage of brain lesions of sudden onset diaschisis and we consider it as a remote effect abolishing temporarily nervous function in regions sometimes far distant from the regions primarily involved but related to the latter by fibers now interrupted. The second stage in the natural history of brain lesion is that of the overactivity of the healthy parts having regained their function but now deprived of the influence (control) normally exerted upon them by the now destroyed or "exhausted" region.

In the light of jacksonian neurology a convulsion is an irritative lesion, an excessive, rapid, and sudden discharge leaving indeed the cortical cells exhausted or temporarily functionless. This temporary exhaustion is responsible for the remote effect of the diminished function, yielding in its turn either to immediate recovery and return of normal function or, if cerebral shock does not pass away immediately, to release phenomena. The result of the examination of postconvulsive reflex activity must necessarily vary according to the stage investigated. We are thus able to explain certain

³ Paralysis has been reported frequently after industrial accidents as well as in shocked animals.

contradictions among various authors concerning the behavior of the reflexes after electric shock (7-9). We also understand that the type of reflex activity can be variable at various shocks in the same patient, again, according to the stage tested, in each individual examination. Diaschisis resulting from the exhaustion of the nerve cells after their sudden, excessive and rapid discharge, may be so short as to escape examination. But diaschisis might also never pass away. As a rule in the postparoxysmic stage the tendon jerks are missing and the plantar responses are of the extensor type. Our case is remarkable for the fact that it displayed the initial stage of brain injury, namely that of cerebral shock, in its purest form by flaccid paralysis and complete absence of all superficial and deep reflexes (found to be present, equal, and of normal strength at previous examinations⁴). The widespread and remote effect which distinguishes neural shock was borne out by the disseminated anatomical damage to the nerve cells. As a rule this effect of cerebral shock is a transient and reversible one; but it was Monakow's conviction and experience that in some instances (and owing to damage to vital centers) death may ensue at the stage of diaschisis.

II. HALLUCINATIONS

Transient focal signs related to the parieto-occipital cortex may appear after electric shock treatment. Agraphia, acalculia, constructive apraxia, inability to discriminate between right and left, disturbances in designing, reading and visual agnosia have been described by Juba (12). The only case of hallucinations observed so far after electric shock is that of Lhermitte and Parcheminey (13). In his interpretation of postparoxysmic hallucinations H. Jackson appealed to the uncontrolled activity of the

highest centers, "over-ready to act," when there is general "reduction" of the brain (as for instance in postepileptic exhaustion). Disease, he taught, destroys certain nervous elements of the highest centers; but the hallucinations are the outcome of activity of lower, nondiseased nervous arrangements of these highest centers. Similarly, the epileptic discharge "removes control" by paralyzing temporarily the highest centers. There is a double condition in insanity, whether acute and temporary or chronic. Hallucinations are positive symptoms due to the overactivity of the healthy parts. Recently, Riese (14) explained the hallucinations seen in patients affected by brain lesions by a breakdown of the resistance offered under normal conditions by central structures to superfluous and incompatible excitations, the purpose of this resistance being to prevent confusion. The exhaustion of the nervous structures after excessive discharge might indeed lead to a temporary breakdown of their resisting power. It remains noteworthy that in our case as well as in that of Lhermitte and Parcheminey hallucinations were auditory.

Neuropathological Interpretation

One of the most outstanding changes was the presence of fatty products in the nerve cells. They were found at all levels with exception of the Purkinje cells of the cerebellar cortex, well-known for their lipophobe nature. Though these fatty products were rather massive, covering frequently the major part of the ganglion cells, we felt unable to make a quantitative analysis, since no objective criteria are available; thus, a quantitative evaluation would always imply an arbitrary factor and not lead to greater precision. Fatty products are to be seen in ganglion cells under the most various conditions, physical diseases, psychoses (dementia praecox, senile dementia). They are also found in the cortex (cornu ammonis) of nonepileptic patients having died after a series of convulsions (15). Thus, they are not specific in themselves. It remains remarkable, however, that fatty products were also found in one of the two fatalities reported previously by Riese (3) and disseminated through the entire nervous system in both these cases. None of these cases was

⁴Electric shock can still be produced after removal of the gyrus sigmoidus in the dog or removal of the entire brain in the pigeon (10). The symptoms of electric shock in the bilaterally decorticate dog are quite similar to those in the intact animals (11). But these observations prove only that electric shock can be produced in animals lacking the cortex and pyramidal tracts. They do not prove, however, that both these structures remain inactive during electric shock in the intact animal or human being.

senile, none schizophrenic, and no other detectable pathologic condition could be made responsible for the disseminated fatty products in the ganglion cells in these two human fatalities after electric shock.

Cellular changes in the Nissl picture were seen in various cortical areas but they were most conspicuous in the frontal cortex. We do not see the necessity of making serial sections in those cases in which cellular changes can be seen at numerous or even all levels studied (it being indeed difficult to see how the same technical factor could interfere with all levels, produce the same effect and always result in pictures in conformity with the pathological cell changes described again and again since the days of Nissl, Spielmeyer *et al.*). Nevertheless, serial sections were made and the cellular changes found in the entire series. Nor does it require special experience to realize that changes in the Nissl picture such as chromatolysis, reduction of the Nissl bodies to the peripheral zone of the cytoplasm, eccentric position of the nucleus, are morphological changes not produced by staining techniques or failures. The cellular picture most frequently encountered in our case was that of Spielmeyer's honeycomb appearance. It was significant that normal cells were found side by side with abnormal ones. Neuronophagia was conspicuous in the frontal areas. But again, none of these cellular changes is specific in itself. Recently, similar changes (associated with acellular areas and minute softenings) were described in sudden death after a single epileptic attack (16). There remain the necrotic and "exploded" areas seen in this case as well as in one of the two fatalities reported by Riese. These areas were found within an intact tissue, associated with a displacement of the ganglion cells and a disruption of the cytoarchitecture. These areas assumed different shapes. While they were circular and stellate in the case reported by Riese, there were also irregular ones, mere slits and rents in the case here described;^a they definitely recalled the pictures described and reproduced by Hassin (17) in his study on the neuropathology of electrocution (see his Figs. 3 and 7). It seems that these areas of disruption represent true microtraumata,

^a Again seen in serial sections.

and have the relatively greatest pathognomonic value among all changes noted. While the circular areas described by Spitzka and Radasch (18) in the brain of electrocuted criminals were ascribed by these authors to a "liberation of bubbles of gas due to the electrolytic properties of the current as it seeks the paths of the least resistance along the vessels," by others to an excessive formation of heat, the rents or cracks are considered by Hassin (17) as purely mechanical in origin, namely, the result of the direct injury set by the electric current. It is our opinion that all changes described gain their importance not because of their presumable or real specificity but because of their *combined and otherwise unexplained appearance in the history of patients submitted to electric shock succeeded by sudden death.*

SUMMARY

1. The case of a 44-year-old woman is reported who developed a flaccid paralysis of all four extremities with areflexia after her second electroshock treatment. After her fourth treatment auditory hallucinations were noted and soon thereafter she died.

2. Adopting the principles of jacksonian neurology the postparoxysmic, flaccid paralysis is explained by the "exhaustion" of the nerve cells of the highest centers after their excessive, sudden, and rapid discharge. This sudden cessation (functional destruction) of nervous function produces in its turn the remote, widespread, and usually transient effects of diaschisis. The hallucinations are interpreted as the result of the overactivity or release of the healthy parts of the highest centers.

3. On histologic examination the central nervous system showed fatty products in the nerve cells, disseminated through all levels, cellular changes and glial reactions in the frontal areas, seen in serial sections, scattered areas of disruption and "explosive" destruction, assuming stellate and circular shapes, but also mere rents and slits, associated with displacement of the ganglion cells. The assumption is made that the changes described are not specific in themselves but gain their importance in relation to the clinical history of shock, paralysis, and sudden death in a relatively young individual show-

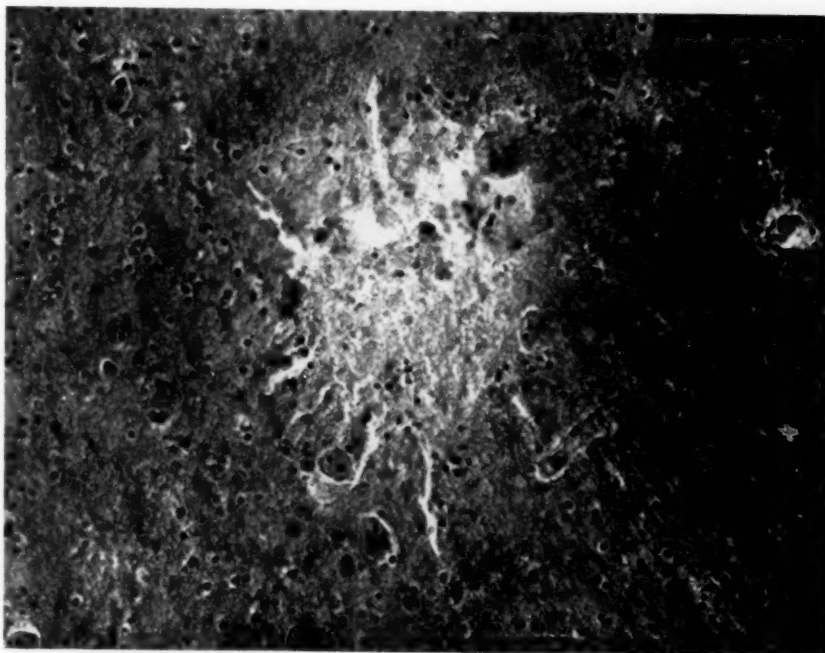


FIG. 1.—A stellate area; from the brain of a 55-year-old woman who died 20 minutes after a single shock. Weil; $\times 190$.



FIG. 2.—A circular area; from the same patient; note the two portions as described and reproduced by Spitzka and Radasch in the brain after legal electrocution: a circular rarified part and a peripheral, condensed zone. Compare with Fig. 3 of Spitzka and Radasch. Weil; $\times 130$.

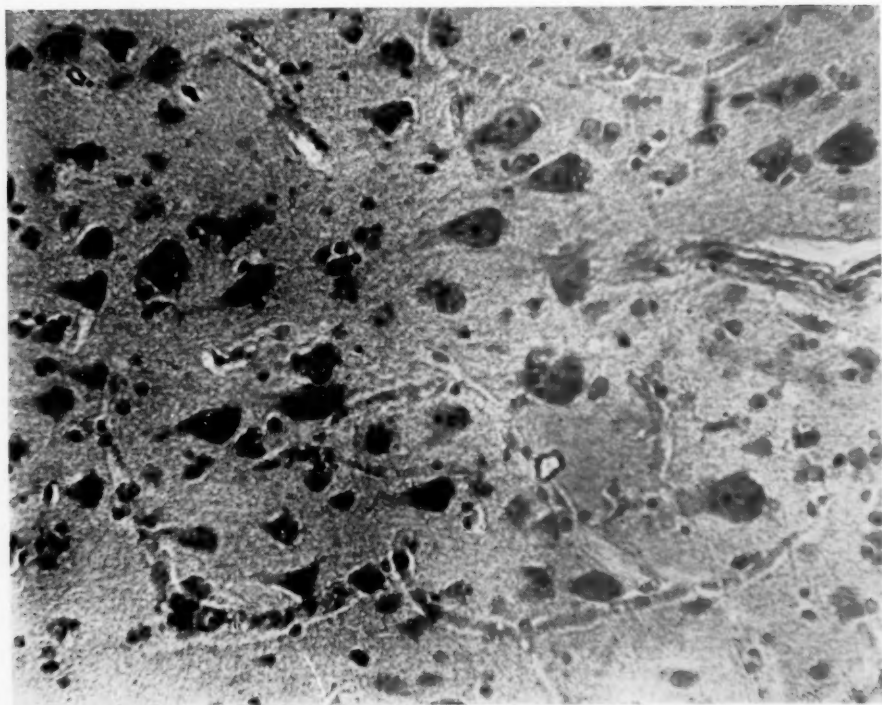


FIG. 4.—Third layer of area 10; note variety of cellular changes in one field; neuronophagia marked in upper part of the section; reduction of chromophile substance to the peripheral zone of the cytoplasm; conspicuous in the large cell of the lower part of the section to the left. Nissl; $\times 270$.

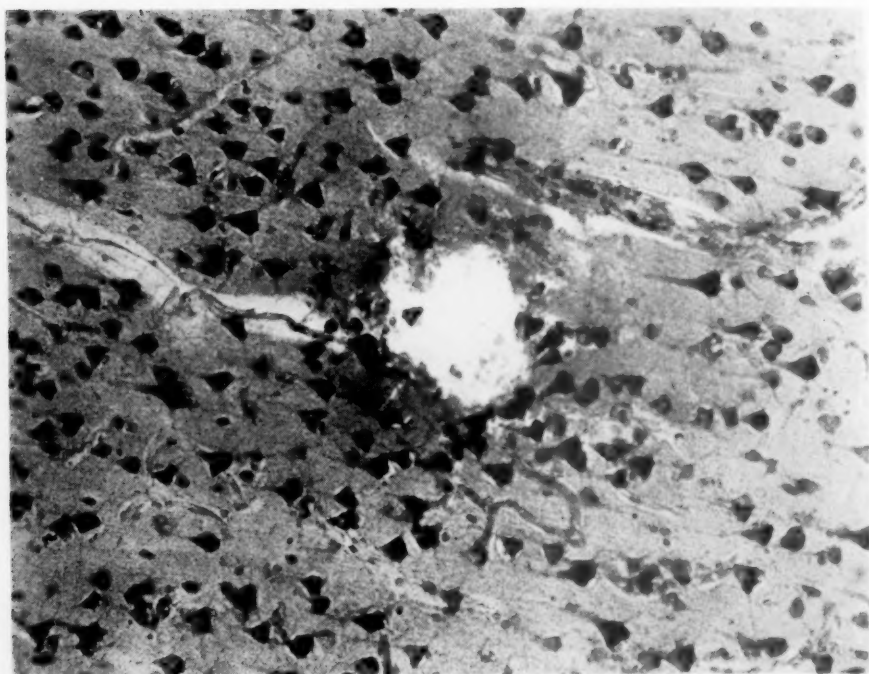


FIG. 3.—Rarified area, almost circular in shape, of area 10 of the patient described in this paper; note the disruption of the cytoarchitecture and the cluster formation of the ganglion cells around the rarified area; note also the relation to the vessels and the enlargement of the perivascular spaces (embedding in celloidin). Nissl; $\times 105$.

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THE PERSONAL PROBLEMS OF SENIOR NURSING STUDENTS¹

ALBERT ELLIS, PH. D., AND EARL W. FULLER, M. D.

Greystone Park, N. J.

In a previous paper, the present authors studied the sex, love, and marriage questions of over 2,000 affiliate senior nursing students, and found 1,908 of their anonymously asked queries to a psychiatric round-table discussion distributed as follows: 735 (39%) of the questions were concerned with love, marriage, and family affairs; 601 (31%) dealt with specific sexual topics; and 572 (30%) were concerned with nonmarital and nonsexual items(2). In this previous paper, the sex, love, marriage, and family questions of the subjects were analyzed and compared with the sex questions of American troops in the European theatre as reported by Brown(1).

The present paper is concerned with the 572 nonmarital and nonsexual questions asked by the nursing student subjects; and it will attempt to show how these may be analyzed to reveal interesting data concerning the girls' nonmarital and nonsexual problems.

The procedure of the study was the same as in the previous one. The group consisted of over 2,000 nursing students who were taking their affiliation at the New Jersey State Hospital at Greystone Park. These girls, who were in their third year of nursing, had been at the hospital (which is a mental institution) for several weeks when they participated in round-table discussions with one of the authors (E.W.F.). They were told, several days in advance, that they were to meet with the director of the mental hygiene clinic, and that they were free to ask him any questions whatever that they might choose to ask. The questions were dropped anonymously into a closed question box; and, after being discussed by the psychiatrist, were preserved, until 1,908 questions had been gathered from 50 different classes of nursing affiliates who were at the hospital from 1942 to 1946. These questions constitute the data of the present study.

¹ From the Northern New Jersey Mental Hygiene Clinic, The New Jersey State Hospital, Greystone Park, N. J.

THE FINDINGS

As noted above, 572 of the 1,908 questions proved to be only slightly or not at all related to sex, love, marriage, and family matters. However, on further analysis, it seemed that the majority were by no means merely objective queries about psychiatry, nursing, medicine, or other topics which student nurses might be expected to ask a psychiatrist; but, on the contrary, they seemed to be but slightly disguised forms of the questioners' own personal problems.

Thus, when a student nurse asks a psychiatrist what the basic difference is between psychosis and neurosis, or whether he believes in the efficacy of shock treatment, or what is being done at veterans' hospitals, it may be reasonably assumed that she is seeking for objective information. But when this same nurse asks the same psychiatrist what the best way is of curing an inferiority complex, or if drinking alcoholic beverages is healthy and permissible, or if there is a great danger of a nurse's being mentally affected by working with mental patients, it may be reasonably assumed that she is presenting, in but a slightly disguised form, one of her own personal problems. Even if she is not in the least aware that she has the problem, and thinks that she is only asking for objective information in this latter type of query, it may be surmised that the problem or one closely related to it is present.

Using this type of yardstick to analyze the 572 nonmarital and nonsexual questions of the subjects, and viewing as a personally oriented question all queries which were quite transparently concerned with problems that the girls seemed to have on their own minds, it was found that 389 of the 572 questions (68%) belonged to this category, while 183 (32%) seemed to be of an objective nature and asked for information which was, at most, only indirectly or very partially related to their personal problems.

When these personal and objective questions were further analyzed, the categorized results listed in Table 1 were obtained.

Typical of the nursing students' questions which were concerned with their personal problems were these:

Isn't it normal to feel somewhat "mental" yourself while working with mental patients?

Can an inferiority complex which has had a long course of development be overcome in a short length of time?

TABLE 1

PERCENTAGE DISTRIBUTION OF 572 PERSONAL AND OBJECTIVE QUESTIONS ANONYMOUSLY ASKED BY OVER 2,000 SENIOR NURSING STUDENTS

Classification of questions	Percentage of questions (N = 572)
Questions concerning personal problems:	
Fear of mental illness in self or family	8
Inferiority feelings	7
Career and job opportunities	6
Interpersonal relations	5
Problems connected with work at the mental hospital	4
Self-consciousness and shyness	4
Drinking	3
Dreams and daydreams	3
Emotional immaturity	3
Emotional instability	2
Religion	2
Desirability of seeking psychotherapeutic assistance	2
Studying	1
Other mild personality problems	15
Other serious personality problems	3
Total	68
Objective questions	
Questions about mental illness and neurosis	18
Questions about astrology, occultism, telepathy, etc.	4
Miscellaneous objective questions	10
Total	32
Total questions	100

What are the advantages and disadvantages of nurses joining the armed forces?

What methods would you suggest in overcoming bashfulness in an individual?

How can you overcome difficulties in a friendship with a girl that goes along smoothly until a third party or a group is around, when she apparently belittles you all the time—seemingly to gain attention herself. It has often proved embarrassing and hurts at times.

Is it necessary to drink in a social group to be accepted?

How do you explain the fact that people will consciously daydream, yet involuntarily, and can't stop it?

Do you think it emotionally immature if after several repeated requests of other people to do certain things and they still fail to do them, the person requesting it becomes provoked and angry?

Should a girl change her religion (she can't honestly say she believes in it) for the sake of a happy home life with to-be children?

Is it a normal healthy mind that thinks it needs mental guidance?

Is running away or avoiding any conflict or problem whatever, abnormal?

How can I overcome fear of death?

How would you overcome depression due to a father's negative views?

That the foregoing questions, even when objectively stated, really concern the personal problems of the questioner should be fairly obvious.

Typical of the objective questions—or at least the *more* objective questions—asked by the nursing students were these:

How long do you think that involuntional melancholics should be institutionalized?

Is or may psychoanalysis be used as a therapy in the treatment of psychotics?

Is there another form of chorea other than Huntington's?

Is there any truth to astrology?

Do you believe in telepathy?

What do you think of radio programs like Mr. Anthony?

Do you think that case studies are of any value to a student nurse?

Does a mother instinct actually exist as such?

From a consideration of the data in Table 1 and the typical questions listed above, the following points seem clear:

1. The more than 2,000 nurses who participated in the round-table discussions led by the psychiatrist seem to have had a great many personal problems. Theoretically, of course, since each nursing student who had a problem could have asked several questions, while those who had no problem could have asked none, the data reveal many problems rather than, necessarily, many subjects with problems. Since, however, every girl was encouraged to submit at least one (anonymous) question, and since the total number of questions (1,908, including the sex, love, and marriage questions, as well as those reported in the present study) was almost the same as the total number of subjects (somewhat over 2,000) it is logical to assume that each question, roughly, equals one subject. If this assumption is correct, and if it is also correct to assume that the great majority of the girls' sex, love, and marriage ques-

tions were personally rather than objectively oriented, then it seems clear that only about 200 of the 1,908 questions were of an objective nature. Presumably, therefore, the great majority of the girls had personal problems about which they were (consciously or unconsciously) eager to question a psychiatrist.

2. Although fear of mental illness leads the list of questions concerning personal problems, the remaining questions present evidence that relatively mild personality problems, rather than very serious ones, are of concern to the subjects. This is all the more probable when it is remembered that the girls, who at the time they presented these questions were working in a mental hospital, should have been expected to over-emphasize the aspect of mental illness in themselves or their families. In spite of this fact, categories like inferiority feelings, interpersonal relations, self-consciousness, drinking, dreams and daydreams, and other mild personality problems seem to concern the girl far more, altogether, than do more serious emotional problems.

3. It comes as no surprise that career and job opportunities should be high among the questions asked by the girls. It may be more surprising, though, that questions about drinking have such a relatively prominent place in the list, while questions about studying are much fewer.

4. While it is to be expected that, since they were stationed at a mental hospital and were asking their questions of a psychiatrist, the girls would direct most of their objective queries to the subject of mental illness and neurosis, it may come as somewhat of a surprise that they also asked an appreciable number of questions about astrology, occultism, telepathy, and similar subjects not directly connected with psychiatry. One wonders whether this reflects a great interest in such subjects, or whether it suggests that a psychiatrist is supposed to be able to answer virtually everything, including the occult.

DISCUSSION

Since the authors' previous paper concerning the sex, love, and marriage questions of the subjects revealed an incredible amount

of ignorance on the part of these senior nursing students, and emphasized their need for considerably more sex education than they apparently have been getting in their nursing schools or elsewhere, the question may now be raised whether their nonsexual and nonmarital questions show an equivalent ignorance of and need for mental hygiene principles. The answer to this question would seem to be emphatically Yes. For a great many, and perhaps the overwhelming majority, of these nursing students' questions explicitly or implicitly announce their fundamental ignorance of some of the most basic tenets of modern mental hygiene.

For example, some of the beliefs and superstitions displayed in their questions are these: That mental illnesses are catching, in much the same manner as contagious diseases are; that there are certain simple specifics for inferiority feelings or self-consciousness, and that one just has to know the right technique in order to overcome these feelings; that only utterly crazy people go to psychiatrists; that the art of getting along with people can be easily learned from hearing a lecture or reading a book; that mental disease is astrologically influenced; etc., etc.

If such superstitions and misleading information are as prevalent among senior nursing students as many of their questions seem to indicate, then it would seem that mental hygiene is now being given a pitifully inadequate part in the curriculum of nursing schools, and that something effective should be done—and done quickly—to remedy this situation. Nurses, more than virtually any other portion of our population, should be in the vanguard of those not merely knowing, but actually *disseminating*, accurate mental hygiene information. If, as some of the data of this study would seem to indicate, this is by no means actually so, then prompt educational measures would seem to be a vital necessity to correct this unfortunate state of affairs.

SUMMARY

The present paper follows a previous study which analyzed 735 love and marital and 601 sexual questions of over 2,000 nursing students. In the present paper, 572 non-

marital and nonsexual questions of these students, as anonymously asked of a psychiatrist, are categorized and analyzed. It was found that 68% of these 572 questions seemed to be concerned (directly or indirectly) with the subjects' personal problems; while 32% were of a more objective character. It was also found that the girls, on the whole, seemed to have a considerable number of (sexual and nonsexual) problems; but that these tended to be about relatively mild rather than severe emotional disturbances. It was noted, finally, that the types of questions often asked by the senior

student nurses tended to show that their knowledge of basic mental hygiene principles was surprisingly inadequate; and it was recommended that nursing schools might well give considerably more attention to the study of mental hygiene in their regular nursing education curricula.

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PROJECTIVE TECHNIQUE WITH NARCOSIS¹

HERBERT DORKEN, JR., M. Sc., AND MARTIN M. TUNIS, M. D.

Montreal, Que.

Intravenous barbiturates have provided a unique approach to the understanding of schizophrenic(1) as well as other psychotic reactions. These agents have also been widely and advantageously used in appraising diagnosis(2), prognosis(3), and of course also as a therapeutic aide(4, 5). Recent work has included numerous quantitative as well as qualitative psychological studies of schizophrenia in patients "prepared" with intravenous barbiturates as in the present study. Despite an enormous amount of research, however, the "psychopharmacologic" action of the barbiturates remains obscure. It is perhaps well, therefore, to summarize briefly some of the more recent views.

In appropriate doses, intravenous barbiturates produce profound depression of the cerebrospinal axis, as utilized in surgical anesthesia. With the smaller (subnarcotic) doses, however, the barbiturates produce clinical effects which suggest strongly a more selective (though variable) effect on the cerebral cortex, and on hypothalamic centres. Gottlieb *et al.*(6) in an excellent paper delineate the controversy which still exists as regards the site of action of the barbiturates on the central nervous system. They review the literature and indicate the consensus of opinion that the barbiturates act more or less selectively on the hypothalamic functions but by a means other than a local action. Goodman and Gilman(7) state that the barbiturates depress (inhibit) the cerebral cortex, especially the motor cortex. They suggest that the hypothalamic effect is probably a result of specialized sensitivity of certain cortical cells, presumably those involved in the corticothalamic pathways. Gottlieb *et al.* refer to electroencephalographic studies(8-11) in schizophrenic patients under intravenous amytal narcosis as well as to Quastel's(12) studies of cerebral metabolism in barbiturate narcosis. They interpret these studies (along with their own investigation) as suggesting "a

deficient and distorted neural function in schizophrenia."

It is apparent, therefore, that it is still impossible to formulate a satisfactory neurophysiological account of the effect of the barbiturates on the central nervous system, doubtless because of inadequacy of present knowledge of normal neurophysiology.

Numerous clinical appraisals of the effects of the barbiturates have been recorded. These suggest, in the main, that these drugs produce their effect by "releasing" the patients from their cortical inhibitions (cortical depression). Further, the depression of the autonomic nervous system(13) may produce the alleviation of the vasomotor and other peripheral manifestations, observed as part of the clinical picture in neurosis.

Many studies have been recorded concerning the use of barbiturates in schizophrenia. Lindeman(14) in 1932 noted that the schizophrenic patient exhibits improved attention, more logical thought processes, and a more adequate affect under the influence of sodium amytal. Broder(15) in 1937 reported that the administration of 0.5 gm. of caffeine sodium benzoate (intramuscularly), followed in 10 minutes by 0.25 gm. of sodium amytal intravenously, produced a beneficial (though temporary) effect on the mutism, rigidity, and slovenliness in catatonia. In 1940 Layman(16) in a study of 25 schizophrenic patients demonstrated improvement of their clinical status while under the influence of intravenous sodium amytal. He used the Stanford Binet, Pintner-Paterson performance boards, tests of motor function, and the Bernreuter personality inventory in his evaluation. He also applied the Rorschach method and demonstrated that the drug produced a superior ability to organize disconnected elements into unified perceptual wholes and greater freedom in association. He did not attempt, in his article, a more detailed analysis of his Rorschach material. Gottlieb and Hope(3) in 1941 studied 100 schizophrenic patients and were impressed with the prognostic value of intravenously

¹ From Verdun Protestant Hospital.

administered sodium amytal. From their article it seems apparent that most of the patients who exhibited little or no improvement following the administration of sodium amytal did not respond favorably to other forms of therapy, as insulin coma or electroconvulsive therapy. The authors felt that those who responded favorably could be regarded as likely to respond very well to the other forms of therapy. This latter contention was subjected to criticism in the published discussion following the article. It is suggested that Rorschach studies of these patients would have aided in assessing the effects of the drug, and its implications as regards prognosis. Finally, Huston and Singer(17) in 1945 presented psychometric studies which showed that schizophrenic patients under amytal narcosis exhibited marked improvement in their reaction times to auditory stimuli. This would of course imply improved attentive effort and a more favorable attitude to the test situation.

Whatever the mechanism of the drug effect, it is common clinical knowledge that intravenous barbiturates often permit the psychiatrist to reach an otherwise inaccessible schizophrenic patient, to explore his mental content, and to evaluate some of the psychopathological processes which are operative. In many instances the barrier erected by the schizophrenic patient is directed not only against the revelation of his unconscious but also interferes with the ingress by (and reaction to) his environmental stimuli. With the development and refinement of psychometrics and more recently projective techniques, there is provided a further opportunity to explore in greater detail the schizophrenic reaction.

In the present study the drugs used were nembital and caffeine sodium benzoate. Nembital produces the barbiturate effects already described, when given intravenously, and the usual dose required was 0.3 gm. Caffeine sodium benzoate was also administered intravenously, following the nembital, and generally within 3 minutes. It was felt that the caffeine relieved the slurred speech which was often troublesome and it was also desired to evaluate this drug as in Broder's article. Further, caffeine allays the sensation of fatigue and facilitates associa-

tive processes(18). Finally its "antagonistic" effect to the barbiturates provides a means to remedy any inadvertent overadministration of barbiturate. The dose of caffeine required was 0.25 to 0.5 gm. Dosages are most effectively determined by careful observation of the patient's reaction, particularly his productivity. No untoward effects related to the drugs used were noted in any of the patients.

Rapaport(19) states that response to the Rorschach involves "a perceptual organizing process which has a fundamental continuity with perception in everyday life. The percepts derive their meaning from the associative processes . . . and the associative processes cogwheel into reality . . . through the imagery aroused by the percepts. These percepts and images are . . . points of orientation for the thought processes . . . binding the associative process to the necessity of reality and preventing them from being directed only by subjected wishes."

Since schizophrenia is regarded by most authorities as involving a disruption of ego function and disturbance of the perceptual processes, it is evident that the Rorschach technique is particularly suitable for study of these patients. The intravenous nembital-caffeine is used to release the patient from inhibitory barriers, manifested as evasion and rejection, paving the way for possible insight into a disturbance of apperception.

Those patients selected for study through the aid of "Projective Technique with Narcosis" are, most profitably, those who present little overt psychopathology or who are resistive and evasive. In schizophrenia (among new admissions) this behavior is most commonly met with in the catatonic and paranoid types. The present study concerned itself with this group of patients.

Their reactions to the Rorschach test fell into 3 categories: those who gave no response (cases B and D), those whose response was limited and lent suspicion of underlying psychopathology (cases A and C), and one individual whose adequate number of responses bore evidence of a psychosis (case E). It will be attempted to demonstrate that intravenous nembital-caffeine in rendering patients more accesible thereby enabled a more efficient revelation of psycho-

pathology. (Though not presented in this article, other projective tests such as the Thematic Apperception Test have been used with equal success.)

CASE PRESENTATION

The method of Rorschach interpretation to be used follows that of Klopfer and Kelley (20).

CASE A.—Diagnosis, paranoid schizophrenia.

On PX this 35-year-old male exhibited signs of marked tension. Pupils were widely dilated, B.P. 140/80, P. 106, with physical tremor. There were suspicious physical signs at the left lung apex but the chest roentgenograph was reported as normal. B.W. negative.

A mental examination revealed delusions of persecution, ideas of reference, and some asocial and antisocial behavior. The patient was committed on a Lieutenant-Governor's Warrant. Memory, orientation, powers of concentration, and general intelligence were appraised as excellent. Employment and academic records indicate persistent effort for improvement of status. The present and first admission to mental hospital follows an insidious development of symptoms. He had received 2 weeks of modified insulin treatment prior to psychometric testing.

Interpretation of the Rorschach, on initial testing, revealed that the prominent features were a marked limitation of productive capacity, evasion and rejection of emotional stimuli, and evidence of a good contact with reality. There were tendencies to vague thought generalization and distortion of libido. Not diagnostic, but would concur with a diagnosis of paranoid schizophrenia.

Under the influence of drugs nearly all responses were given "masturbatory" and/or "castration" qualifications (19), strong suggestion of a disturbance of libido function. Further, there was an almost complete denial of aggression, yet bodily reference was present. Contact with reality appeared good but there was some indication of an attempt to dissociate emotional aspects from objective reasoning. The general reaction to narcosis was favorable and revealed a relatively good intellectual preservation which with other qualitative features should lend good prognosis to this case.

CASE B.—Diagnosis, schizophrenia, type not determined (catatonic and paranoid features prominent).

PX of this muscular, well-nourished youth of 18 was essentially negative revealing a negative B.W. and normal chest roentgenograph.

It was necessary to administer intravenous nembutal to gain sufficient cooperation for mental examination. The symptoms of resistance, mutism, suspicion, and tension decreased with narcosis, displaying underlying systematized and grandiose delusions in which the patient considered himself to be the "Holy Atom." Present symptomatology became evident 2 months prior to this, his first

hospitalization. At the time of testing the patient had received no treatment but in the next 4 months was given 51 insulin coma treatments, 34 modified insulin treatments, and 9 electroshock treatments. This resulted in some improvement of communication, some dissolution of delusional material, but essentially an insufficient personality change to warrant discharge.

Prior to narcosis the patient had entirely rejected the test situation. The drugs were effective in producing a Rorschach record unusually rich in symbolic response content. Ideation took the form of primitive fantasy subserving his instinctual needs. There was a vague, all-embracing, nonproductive, emotional expression related to bodily functions in a bizarre fashion with signs of inappropriateness and tendencies to aggression. Stereotypy and constriction were evident but the intellectual control was poor. Few responses were not tinged by delusional phenomena with which a preoccupation had reached the severity of perseveration. The presence of confabulation, contamination, bizarre responses, perseveration, and peculiar response elaborations was highly suggestive of schizophrenia. Since profound delusional fantasy and intellectual disorganization underlie the patient's resistive barrier, prognosis is none too favorable.

CASE C.—Differential diagnosis, manic-depressive, depressed, or catatonic schizophrenia. Final diagnosis, catatonic schizophrenia.

This youth of 18 showed on PX the usual signs of tension, i.e., dilated pupils, B.P. 135/85, P. 92. The chest roentgenograph was normal and the B.W. negative.

Mental examination revealed that the patient was confused, uncommunicative, and suffering impaired concentration. Somatic delusions such as a lack of blood were present. Recent social behavior indicated a refusal to meet former friends. This was his second admission to hospital in the space of one year. On first admission he exhibited overactivity, excitement, and expansive grandiose delusions. The patient's brother is a deteriorated schizophrenic, resident of the same hospital. At the time of testing the patient had received 7 electroshock treatments. Since then he has been given 57 insulin coma treatments and an additional 7 electroshock treatments over a period of 3 months. There were periods of clinical improvement always followed by persistent relapse.

Production in the first Rorschach testing was limited and there was little response elaboration. Response to emotional stimuli was extremely prolonged and there were signs of negativism. Ideation was of a primitive nature with indication of preoccupation with fantasy. A severe shading shock was evidence of deep personality disturbance. The record was not diagnostic but suggestive of considerable underlying psychopathology.

Narcosis was used as an aid to investigate its specificity and revealed an expansive overideation with tendencies to contamination, perseveration, and abstraction. The response content was highly unusual and many were bizarre with frequent sexual symbolism of physical union. These findings are

highly suggestive of a schizophrenic thought disturbance. Prognosis in view of the severity and depth of the thought disorganization is poor.

CASE D.—Admission diagnosis, possible schizophrenia. Final diagnosis, chronic paranoid schizophrenia.

Though on PX this 46-year-old man was found to be severely malnourished, there was no evidence of specific vitamin deficiency. The B.W. was negative and the chest roentgenograph showed old healed fibrosis at the right lung apex.

The anamnesis revealed considerable abnormal behavior. With the death of his wife in 1937 this formerly industrious man became fanatically religious, disowned his family, sold his house, stopped work, and went to live by himself in a shack. The patient was resistive, at times refusing food and going on self-imposed starvation "cures," and has refused to sign his name or even take a pen in hand. Mental examination revealed the presence of delusions, the patient believing that Judgment Day is at hand and that God is calling him to make prophecies. Orientation and memory were good. This is his first admission to mental hospital for what appears to be an illness of long standing. At the time the psychometrics were performed the patient had received no treatment. After testing he was started on modified insulin and has received 14 treatments to date with no improvement or change in his mental condition.

The patient rejected all Rorschach cards until intravenous nembutal-caffeine was administered and then gave a record highly suggestive of a chronic deteriorated schizophrenia. Perseveration of an evasive nature was employed and there were signs of bodily preoccupation bearing bizarre connotations. There was evidence of some loss of reality contact. The presence of color deterioration responses with signs of increasingly pronounced intellectual disorganization as his resistive barrier was overcome by narcosis tended to indicate a deep insidious mental disturbance which probably will not prove reversible.

CASE E.—Provisional diagnosis, adult maladjustment. Final diagnosis, paranoid schizophrenia.

PX of this 32-year-old male showed him to be of essentially good physical health. The patient gave a history of pleuritis with effusion, probably tuberculous, in 1940. A chest roentgenograph, however, showed only blunting of the left costophrenic angle with no evidence of disease of the pulmonary parenchyma. The B.W. was negative.

Little severe or unusual psychopathology was revealed by the mental examination. There were indications that the patient felt people were against him; however, these complaints had some basis in reality. Concentration, memory, and orientation were good. The anamnesis revealed that he had approached women sexually on occasion and was given to being somewhat suspicious, and at times uncooperative. He is a refugee and presents some language barrier. The onset of symptoms was dated to 3 months prior to this his first admission. He had not received any treatment and the clinical

picture showed no change. Some 3 months have elapsed since the psychological evaluation.

In the initial Rorschach test there were signs of constriction with indication of psychotic intellectual disorganization. Sexual preoccupation was present and there was some suggestion that the patient's aggression was apt to be bizarre and the result of primitive fantasy stimuli.

Under the influence of drugs the picture did not change in nature but only in degree. The sexual preoccupation became a profound perseveration, bizarre and irrational, with confusion of sexual identification. There was a definite increase in bizarre percepts and disorganization of the thought processes which was highly suggestive of schizophrenia. The depth and extent of increasingly severe psychopathology under narcosis was considered a poor prognostic indication.

In two of the cases presented the psychometrics were paramount in establishing diagnoses (cases D and E) while aiding in clarification of the others. Subsequent clinical observation has revealed no significant disagreement with these test findings; however, insufficient time has elapsed to corroborate the psychometric prognoses.

The psychometrics have been presented in descriptive form. Quantitative analysis permits several further conclusions (Table 1).

To be expected from the selection of cases was a poverty of response to initial testing. There was a definite increase in the average number of responses with narcosis and no rejections. However, an increase in the frequency of anatomical, bizarre, and poor form (F-%) responses reflected the revelation of psychopathology. The manner of approach remained consistent and typical of the schizophrenic personality; an emphasis on vague generalizations with little concern for practical details (W% and D%)(16). The extent of ideation is within normal limits (% of movement R), but has previously been shown to be under the influence of considerable psychotic disorganization. Response to emotional stimuli, as might be expected with the schizophrenic patient, is impoverished. Though somewhat improved with narcosis (% of color R) this emotional response displayed, qualitatively, some crudeness of affect. A tendency for attempted intellectual control (F%) existed which interpretation had indicated to be more the result of psychotic impairment rather than an effective adjustment.

An interesting feature was the increase of possible "organic" symptomatology with administration of nembutal-caffeine. The test may thus have reflected the physiological effect of the drugs or the drugs may have been responsible for a revelation of possible organic dysfunction. Note, too, that only in case A did the Rorschach give a favorable prognostic indication. In this instance the instability:disability ratio(21) tended to indicate psychogenic instability while the

factory examination was impossible. Material so obtained could be evaluated and prove of diagnostic aid and in some cases, where indicated, provide further information on which to determine the most effective method of treatment available for a particular patient.

Response to the nembutal-caffeine was good indication not only of the extent of psychopathology but also of the degree of intellectual and personality preservation

TABLE 1
STATISTICAL ANALYSIS OF THE RORSCHACH

	Re- sponses	Rejec- tions	% of Move- ment R	F%	F-%	% of Color R	W%	D%	At%	O- (Bi- zarre)	Or- ganic Signs (Pio- trow- ski)	Insta- bility Disa- bility:
CASE A												
Test 1	4	6	25	25	..	..	75	25	..	..	2	20:3
Test 2	12	..	8	42	8	17	50	42	17	..	4	13:-3
CASE B												
Test 1	0	10	..	..	..	..	..	..	..	..	..	.....
Test 2	15	..	27	47	27	20	67	27	7	2	5	7:3
CASE C												
Test 1	10	1	20	30	20	10	60	30	..	..	3	11:4
Test 2	20	..	55	40	20	5	75	25	..	5	4	1:16
CASE D												
Test 1	0	10	..	..	..	..	..	..	..	..	..	.....
Test 2	14	..	14	43	29	21	86	14	14	1	8	-7:20
CASE E												
Test 1	18	..	28	72	40	..	56	33	28	4	3	18:13
Test 2	21	..	19	76	48	5	38	52	38	7	5	13:13
AVERAGE												
Test 1 *	6.4	5.4	(24)	(42)	(20)	(3)	(64)	(29)	(9)	(1)	(3)	(16:7)
Test 2	16.4	0	25	50	26	14	63	32	15	3	5	5:10
NORMS	24	..	29	33	..	25	25	50	..	..	..	..

* () Average based on the 3 cases who responded during initial testing.

remaining 4 cases, which had a poor prognosis, showed an average instability:disability ratio of 4:13, lending suspicion of organic impairment. Perhaps further investigation might substantiate this possibility. Articles have been published which suggest the presence of organic brain dysfunction in schizophrenia(6, 10).

PRACTICAL IMPLICATIONS

Most important is the fact that administration of the drugs rendered accessible patients who, but a few moments prior, had been resistive and evasive such that satis-

thereby aiding in prognosis. Analysis of the cases presented in this study implied that more than mere response under narcosis is necessary if the patient is to have a favorable prognosis(3).

SUMMARY

1. Recent opinions as to the action of subnarcotic doses of barbiturates on the central nervous system are summarized. Reference is made to the view that electroencephalographic studies of schizophrenic patients suggest a "disorder of neural function," i.e., an organic brain dysfunction.

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2. Projective technique with narcosis was applied to 5 cases of schizophrenia. Intravenous nembutal (0.3 gm.) and caffeine sodium benzoate (0.25 gm. to 0.5 gm.) were administered. The dosages were adjusted for the individual patient as judged by clinical response.

3. Detailed analysis of the Rorschach material thus obtained revealed that:

A. Narcosis is an aid to the psychological examination of the resistant or inaccessible schizophrenic patient.

B. Underlying psychopathological processes are readily elicited.

C. Diagnostic, prognostic, and therapeutic implications of this method are noted.

D. Analysis of the psychological material suggests the possibility of organic brain dysfunction in the patients examined.

Special thanks are extended to Dr. Reed, hospital superintendent, for his cooperation and kind permission to publish.

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NOTE ON A SUICIDE KEY IN THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY¹

WERNER SIMON, M. D., MINNEAPOLIS, MINN.,²

AND

WILLIAM M. HALES, PH. D., ST. CLOUD, MINN.²

A number of attempts have been made to study suicidal preoccupation and self-destructive tendencies with the aid of psychological tests. The Rorschach test has been employed for this purpose. Beck(1), Rabin(5), and Lindner(4) have presented individual cases and discussions of this problem. Hertz(3) has made a systematic study of Rorschach patterns thought to be suggestive of suicidal tendencies and has identified 10 configurations which appear especially prevalent in the records of suicidal patients. The Thematic Apperception Test has also been used as a valuable instrument in evaluating suicidal drives. The Minnesota Multiphasic Personality Inventory (MMPI)(2) was first employed by one of us (W.S.) for the purpose of studying personality structure and trends in the profiles of patients having clinically established suicidal tendencies(6). Attention was called, in the preliminary conclusions, to an elevation of the depression and psychasthenia scales in schizophrenic patients. It was the impression of the investigator that a rise in the depression score was the "appropriate affective component of suicidal tendencies," and that the elevation of the psychasthenia scale was an indication of "a strong obsessive-compulsive component, often clinically observed by manifestations of impulsive tendencies." It was then observed that "it is perhaps this component (psychasthenia) which, when coupled with depression, may determine the actual attempt at self-destruction in the schizophrenic."

With this in mind we have studied a number of MMPI profiles of patients with clinically established suicidal preoccupation, but various diagnostic classifications. Among 50 profiles so studied, we have found a consistent rise on the D and Pt scales. The group included patients with schizophrenia,

psychoneurosis, depressive phase of manic-depressive psychosis, involutional melancholia, and senile psychosis. While elevations on the D and Pt scales are the most prominent in reactive depressions, anxiety reactions, and obsessive-compulsive states, there are definite secondary elevations on these 2 scales in the profiles of suicidal patients in other diagnostic groups. An item analysis of the D and Pt scales, which includes the questions most frequently answered in the positive direction, reveals some of the preoccupations and emotional conflicts of these suicidal patients.

The items in the depression scale most often answered in the positive direction by the majority of these suicidal patients are listed according to frequency:

1. I go to church almost every week (D-10).
2. I wish I could be as happy as others seem to be (F-36).
3. Criticism or scolding hurts me terribly (F-34).
4. I certainly feel useless at times (I-37).
5. I seldom worry about my health (A-6).
6. I am easily awakened by noise (B-31).
7. I work under a great deal of tension (I-34).

The items in the psychasthenia scale most frequently answered in the positive direction by the majority of the patients studied are as follows:

1. I wish I could be as happy as others seem to be (F-31).
2. My hardest battles are with myself (I-13).
3. I frequently find myself worrying about something (F-46).
4. I certainly feel useless at times (I-37).
5. I am inclined to take things hard (I-32).
6. I have periods of such great restlessness that I cannot sit long in a chair (G-21).
7. Sometimes I become so excited that I find it hard to go to sleep (G-22).
8. I seldom worry about my health (A-6).
9. I have several times given up doing a thing because I thought too little of my ability (I-25).
10. I easily become impatient with people (F-31).

To illustrate the suicide key in the profile

¹ Published with permission of the Medical Director, Veterans Administration, who assumes no responsibility for the opinions expressed or conclusions drawn by the authors.

² Veterans Administration Hospital.

of a patient with reactive depression, the following brief case history is presented:

CASE 1.—N.S. A 34-year-old white male of high average intelligence, with an excellent army service record. In August 1947, while stationed in China as a Government employee, his vision became impaired. He returned to the U.S. where his condition was diagnosed retrobulbar neuritis. Patient's vision continued to fail, causing considerable anxiety and depression. He enrolled in a school for the blind, but his depression increased, and on December 3, 1948, he jumped into a river, with suicidal intent. Upon admission to the hospital, marked depression was evident. The extent of his depression was characterized in the TAT, story 15, by the phrase "an obsession for death." The MMPI revealed a depression score of 96, and a psychasthenia score of 91.

The rise of the depression and psychasthenia scores in the profile of a patient with schizophrenia is illustrated by the following case:

CASE 2.—L.H. A 35-year-old white male, admitted to the hospital following a suicide attempt by cutting his throat with a razor blade. He had a history of an acute psychotic episode while in service. On admission he had many delusional ideas concerning people talking about him, dictaphones planted in his room, and the radio broadcasting information about his past life. He readily admitted suicidal thoughts and said he would again try to kill himself, but felt that he was being watched and "they would not let him die." The Multiphasic revealed a depression score of 94, psychasthenia of 89, and schizophrenia of 92.

Suicidal intent is often denied by the patient, but later admitted after repeated interviews, as in the following case:

CASE 3.—J.N. A 34-year-old white male, admitted to the hospital upon request of his parents who stated that there had been a marked change in his personality for several months, characterized by withdrawn and seclusive behavior, pacing the floor at night, depression and agitation, and refusal to eat or talk to anyone. Following admission he denied any suicidal ideas, past or present. Upon examining the MMPI profile, characteristic elevations on depression (89) and psychasthenia (93) were noted, with a secondary rise on schizophrenia (88). In a later interview, patient acknowledged that he had entertained suicidal ideas for some time and had made an attempt to kill himself by drinking lysol.

The following patient made a serious suicidal attempt. An MMPI test was taken on the day before he attempted self-destruction:

CASE 4.—L.K. A 23-year-old white male, hospitalized after drinking a pint of rubbing alcohol, with suicidal intent. There was a history of psychoneurosis for the past 5 years, which originated in service. Marked feelings of hostility toward his mother and his wife were brought out in psychotherapeutic interviews. Acting out of these feelings, and escape in alcoholism, with reliving of combat experiences, were prominent. Patient readily admitted that he had planned to end his life. The scores revealing suicidal preoccupation in the MMPI taken on the day before the actual attempt were: depression 79, and psychasthenia 75.

Frequently patients evade direct questions aimed at eliciting suicidal tendencies in clinical interviews, and the same appears to be true in the psychological testing situation, inasmuch as question F-38 in the D scale ("I usually feel that life is worth while") was answered in the negative direction by less than one-sixth of the suicidal patients.

A statistical treatment and more discriminative data, as well as a control series, are necessary to fully evaluate our preliminary findings, thus far based mainly on clinical observations. Development of a suicide key, with the MMPI as an instrument, should be of considerable practical significance, inasmuch as this test is relatively simple to administer and is already widely used by psychiatrists, psychologists, social workers, vocational counsellors, and personnel supervisors. Clinically unsuspected suicidal risks could thus be detected and precautionary measures and proper treatment instituted. In industry, accident-prone employees could be tested for any possible basic suicidal preoccupation as a motivating factor.

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HISTORICAL NOTE

THE SOUTHERN PSYCHIATRIC ASSOCIATION

A word concerning the origin and growth of the Southern Psychiatric Association may be deserving of record, inasmuch as this society is the largest, geographically speaking, of the regional psychiatric organizations in the country and embraces 16 of the southern states and the District of Columbia. The geographical area of the Southern Psychiatric Association is exactly the same as that of the Southern Medical Association, which comprises the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia, and the District of Columbia.

The S.P.A. was organized in Memphis in 1935. The idea of forming a society of southern psychiatrists was conceived by Newdigate M. Owensby of Atlanta, who has done more than any other dozen members of the Association to make this organization the outstanding one that it is today. In 1935 Dr. Owensby wrote all recognized psychiatrists in the South inviting them to join him in the organization of this Association. Dr. Richard Bunting of Memphis was in favor of the movement and invited them to meet in Memphis, where the first meeting was held. A program was arranged and all psychiatrists in the South were again invited to come to the meeting and join the society. At this meeting Dr. Bunting and Dr. Owensby were the only members, but at the end of the meeting 30 southern psychiatrists had applied for membership and an invitation was presented for a meeting in New Orleans the following year. In the beginning it was difficult to get prominent southern psychiatrists to appear on the program, and leading eastern psychiatrists were most helpful by graciously presenting excellent material at the annual meetings. On one occasion there were as many as four Ex-Presidents and the then President of The American Psychiatric Association. In later years practically all programs have been fur-

nished almost entirely by southern men. The number of contributions from the actual membership has rapidly increased, and at the meeting in Dallas last year the entire program was contributed from within the membership. The first name of the Association was The Southern Neuropsychiatric Association, but tradition has it that certain "big-wigs" in The American Psychiatric Association disliked the name and recommended the name of Southern Psychiatric Association, which change was made before the New Orleans meeting.

In reviewing earlier programs of the meeting, it is noted that leading surgeons, gynecologists, internists, and, in fact, outstanding members of any other specialties were invited, and asked particularly to give their point of view on psychiatry in relationship to their work. This type of program was continued until the beginning of the war, during which time the Association did not meet. Since resuming the annual meetings the program has largely been a psychiatric one, although the present Board of Regents feels that the original idea was a healthy one and it may be revived.

At the onset there was a considerable amount of opposition to the formation of the Southern Psychiatric Association, as many southern psychiatrists felt that the Section on Neurology and Psychiatry of the Southern Medical Association was sufficient. Success in overcoming this and other opposition to the society is due in a large part to the perennial secretary, who at times had to dig into his own pocketbook in order to keep it going.

The Southern Psychiatric Association today is an outstanding organization with 154 members from the southern states, who have been described as "the cream of the crop of the South." The Board of Regents has set down rather rigid standards for admission to fellowship in the organization. They prefer men who are diplomates of the American

Board of Neurology and Psychiatry or men who they feel will likely become diplomates. There are other members who are not diplomates of the Board but whose psychiatric standing is without question. The last meeting, which was held in Dallas, Texas, in December, was very well attended and excel-

lent scientific presentations were heard. The members know that there is a very definite place in the psychiatric world for this group of men in the South, ethically sound, and by heritage and training for the most part conservative in outlook and practice.

R. FINLEY GAYLE, M. D.

CORRESPONDENCE

SWISS SOCIETY OF PSYCHIATRY¹

Editor, AMERICAN JOURNAL OF PSYCHIATRY:

SIR:—The 111th meeting of the Swiss Society of Psychiatry was held on the afternoon of June 25 in Rheinau, one of the mental hospitals of the Canton of Zurich, under the presidency of Professor Morel (Geneva). The hospital, incidentally, is beautifully situated on the Rhine; the main building is a former monastery with a wonderful church. The topic of the afternoon was "The Psychiatric Indications for the Interruption of Pregnancy." The report was given by Dr. Binder (Rheinau); communications were made by Dr. Glaus (Zürich-Burghölzli), Prof. Klaesi (Bern-Waldau), Dr. Zolliker (Münsterlingen), Dr. Strasser (Zürich), Prof. Gaupp (Stuttgart, Germany). There was some discussion.

The Criminal Legal Code, i.e., the Swiss Federal Criminal Law, pronounces interruption of pregnancy by a physician as not punishable if the pregnant woman is either in mortal danger or if the continuation of pregnancy would entail serious and lasting damage to her health. There is, as in the States, a certain latitude left to the judiciary of the individual cantons as regards the interpretation of the law. The main emphasis for the psychiatrist lies, of course, in the second point. It was generally agreed that (1) the existence of a psychosis *per se* was not reason enough to interrupt the pregnancy, that in such instance the person and her total life history must be considered and judgment formulated accordingly; (2) a merely eugenic indication is not implied in and cannot be deduced from the law; (3) in nonpsychotic cases the emphasis in reaching a decision must not be laid on the condition in which the pregnant woman comes to examination so much as on her whole makeup

and past history in order to come to a clear opinion whether or not she will be able to carry on during pregnancy and afterwards without serious danger as regards the fulfillment of her life's work and duty. It is here, naturally, where a stern expert may be too reluctant and a liberal one may go a little too far, i.e., where—not even among psychiatrists—can the personal equation be eliminated.

On the forenoon of June 26 the Society met in the Zoologic Institute of the University of Zürich. The topic was: "The Applications of Electroencephalography in Psychiatry." Dr. Monnier (Geneva) gave the report, including some work done with Drs. Horneffer and Mutrux on EEG studies on phenyl-pyruvic in oligophrenia and Sturge-Weber-Krabbe's disease. My impression was that the reporter might be inclined a bit too enthusiastically to interpret the EEGs. The same impression seemed to have occurred to the following two speakers: Dr. Jung (Freiburg, Germany), who discussed the EEG in psychiatric shock therapy, and Dr. Hess (Zürich-Burghölzli) who briefly spoke on EEGs in impulsive states (*dranghafte Zustände*). Dr. Remy (Bern-Waldau) read a short paper on the showing of affectivity in the EEG, or better the not-showing of it, in emotionally damaged patients (progressed seniles, schizophrenics, et al.).

The participants were entertained at supper by the State Council of the Canton of Zürich on the 25th in the little Castle of Laufen, situated at the famous Rheinfall bei Schaffhausen (cataract of the Rhine near Schaffhausen). Many of them lunched together after the close of the Sunday session (June 26). There were a couple of Americans at the meeting.

EUGEN KAHN, M. D.,
Vitznau, Lake Lucerne,
Switzerland.

¹ On request, Dr. Kahn very kindly submitted the above report of the meeting of the Swiss Society of Psychiatry, which he attended. Ed.

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ONE THOUSAND UNSUCCESSFUL CAREERS

Editor, AMERICAN JOURNAL OF PSYCHIATRY:

SIR:—"One Thousand Unsuccessful Careers" by Drs. Stearns and Ullman, in the May issue of the American Journal of Psychiatry, is an illuminating study of the shiftless element in our population. However, the repeated use of the words "poor" and "poverty" is very misleading. Millions upon millions of people in this country and throughout the world are habitually thought of as "poor," yet they have nothing whatsoever in common with the type of individual studied in the above report. Among our "poor," we number the poor farmer, the tenement-dwelling industrial worker, many of the so-called "white-collar class," and even many of our schoolteachers—all steadily employed, hardworking, anxious to make as great an income as their opportunities will allow (and we have no right to assume that they lack these traits, without conclusive statistical evidence). This type of mass poverty may indeed be labelled "a disease of our culture," since it is related to economic and social factors and has nothing

to do with the individual's capabilities, temperament, and ambition.

The danger of loose thinking, when "poverty" is not clearly defined, is conveniently demonstrated at the end of the above-mentioned paper, where the discussant, Dr. David C. Wilson, speaks in generalities about "the chronic poor" as a "disease of our culture," and appears to be implying that just anyone at all who happens to be "poor" has only himself to blame and that we ought to revise our attitude of "pampering" and encouraging people to become poorhouse wards.

Dr. Stearns and Dr. Ullman should have stressed much more emphatically in their excellent paper that they were not in any way making a sampling of *all* low-income groups, but were dealing with a very circumscribed stratum of the population—*dependent paupers*. And they have convincingly shown that the vast majority of such individuals owe their plight to inherent psychopathic traits and *not* to any cultural influences.

HENRY G. GRAND, M. D.,
New York City.

REPLY TO THE FOREGOING

Editor, AMERICAN JOURNAL OF PSYCHIATRY:

SIR:—We do not pretend to define "poor" or "poverty," but for our purposes an unsuccessful person is one who has not made the grade and, in the end, has to be cared for by others. In general, we heartily agree with Dr. Grand's comments. While we do not profess to have made a sampling of poor people or the poverty stricken, we do feel that we have a valid sampling of the unsettled poor of Massachusetts. However, our patients have deficits all along the line; but there are a great many persons who do get along very well through their own efforts,

with similar deficits. Therefore, it would seem reasonable to assume that there is some mental quality, as yet unidentified, which has interfered with the proper function of these human organisms in the milieu called society. If their problems are individual, then the techniques of medicine and social service would seem to be applicable.

We appreciate Dr. Grand's generous approval of our paper and are glad to have his constructive comments.

A. WARREN STEARNS, M. D.,
Medford, Mass.

PROPOSED AMENDMENTS TO CONSTITUTION AND BY-LAWS

Proposals to amend the Constitution and By-Laws of The American Psychiatric Association submitted by the Committee on Reorganization and presented in writing at the annual meeting, May 25, 1949, in accordance with Article VIII of the Constitution.

CONSTITUTION

1¹

Article III, Section 1 to be stricken out and the following substituted therefor:

1. There shall be these classes of members: Fellows, Members, Associate Members, Life Fellows, Life Members, Honorary Members, Inactive Members, and Corresponding Members.

2

Article III, Section 2. This section to be amended by striking out the phrase "United States or its dependents or British America" and substituting therefor the phrase "The Americas" so that the section read as follows:

2. All classes of membership except Honorary and Corresponding Members shall be residents of the Americas at the time of their election.

3

A new paragraph to be known as Section 10, to be added to the end of *Article III*, to read as follows:

10. Any member or Fellow who has been in good standing for ten years or more, and who establishes inability to continue payment of dues as a consequence of hardship, illness, or retirement, may apply for Inactive Status. Such status will be granted in appropriate cases by the Council on recommendation of the Membership Committee. An Inactive Member will be entitled to register as a member at Annual Meetings, but will not pay dues, nor will he be eligible to vote or hold office.

4

It is proposed that the Roman numerals presently affixed to the paragraphs in *Article III* be deleted, and that serial Arabic numerals be used to designate the sections.

¹ This and the following numbers indicate the separate proposals.

5

It is proposed that serial Arabic numerals be prefixed to each of the present paragraphs of *Article IV*.

6

It is proposed to strike out the first paragraph of Section III of *Article III*, and to renumber it Arabic 3 and to replace it with the following:

3. A Committee on Membership of six Fellows shall be appointed by the President and approved by Council. Each member of this committee will serve a 3-year term, and then be ineligible for immediate re-appointment. Two members of this committee will retire each year. Terms of the first members appointed after adoption of this section shall be adjusted accordingly. It shall be the duty of this committee to make a report and recommendation to the Council on every application for every class of membership. (Second paragraph of this section, unchanged.)

7

Recommend that *Article VI* of the Constitution be amended by prefixing serial Arabic numerals to the several paragraphs thereof.

8

Recommend that the first paragraph of *Article VI* of the Constitution be numbered Section 1 and read as follows:

1. The President-Elect, the Secretary, the Treasurer, one Auditor, and the appropriate number of Councillors shall be elected annually by mail ballot as provided in the By-Laws and in accordance with the procedure of section 6 of this article.

9

Recommend that the second paragraph of *Article VI* be numbered 2 and read as follows:

2. Each Councillor and Auditor shall serve for three years. The other officers listed in *Article IV* shall

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each serve for one year. If a vacancy occur in any office, the Council shall designate a Fellow or Life Member to fill the unexpired term.

10-13

Recommend that additional sections be added to *Article IV* as follows:

(10)

5. Any Fellow nominated for office by a petition signed by 50 or more members or fellows shall be considered an eligible candidate and his name shall be included on the official ballot for the next general election, provided that such petition has been filed with the Secretary of the Association prior to January 21.

(11)

6. Not later than January 1, the Nominating Committee shall announce the selection of a panel of candidates, at least one for each vacancy.

(12)

7. An official ballot will be prepared by the Secretary, on which will be included the names of all candidates selected by the Nominating Committee or nominated by petition. The official ballot will be mailed to all eligible voters between February 1 and February 15. The date on which ballots will be tallied shall be announced in a memorandum accompanying the ballot. This date will be not earlier than two weeks nor later than one week before the opening of the Annual Meeting. All properly sent ballots returned prior to the time of tally shall be counted and the person who receives the greatest number of votes for each single office will be certified as elected thereto; and the candidates for office as Councillors who receive the highest number of votes will be certified as elected to the Council. Results of this election will be announced at the Annual Meeting.

(13)

8. The President-Elect will be installed as President on the final day of the Annual Meeting next following the Annual Meeting at which his selection as President-Elect was announced. If the position of President-Elect becomes vacant during the term, the Council will select a Fellow to serve as President-Elect and he will be installed as President at the Annual Meeting next following.

14

Recommend that *Article VII* of the Constitution be amended by assigning serial Arabic numerals to the sections.

15

Recommend that the first paragraph of *Article VII* be amended by omitting the last sentence, so that the paragraph read:

1. The President shall appoint the personnel of all committees unless otherwise provided. He shall preside at the annual and special meetings of the Association or Council. In his absence at any time, the President-Elect shall act in his place.

16

Recommend that the second paragraph of *Article VII* be deleted. This deletes the sentence reading "The President-Elect shall assume the Office of President at the close of the Annual Meeting held one year after his election." (This is covered in Section 8 of *Article IV*.)

17

Recommend that the Treasurer be made a member of the Executive Committee and, to that end, that the fifth remaining paragraph of *Article VII* of the Constitution be amended to read as follows:

5. The Council shall elect an Executive Committee to consist of the President, the President-Elect, the Secretary, the Treasurer, and two others of its members which shall have the powers of the Council (at such times as matters important to the Association must be decided and it is considered unnecessary to call the Council together) between meetings of the Council.

18-21

Recommend that *Article VIII* of the Constitution be amended by striking it out and substituting therefor the following:

(18)

1. Proposals to amend this Constitution may originate either (a) by a petition signed by 50 or more Fellows or Members or combination thereof; or (b) by resolution of the Council.

(19)

2. If prior to 30 days before the opening of the next Annual Meeting, the Secretary receive a petition signed by 50 or more Fellows or Members, or combination thereof, a proposal to amend the Constitution, such proposal shall be submitted to the Council and placed on the agenda for reading at the next Annual Meeting. If at any time prior to the first day of an Annual Meeting, the Council pass a resolution endorsing a proposed amendment, the text thereof shall be read at the next Annual Meeting.

(20)

3. After a proposed amendment (no matter how originated) is read at an Annual Meeting, the text therefore shall be published in the JOURNAL (or otherwise made known to the membership) within 90 days after adjournment of that Annual Meeting. Not less than 60 nor more than 180 days after this publication or circularization, the proposed amendment shall be submitted to the membership by mail for a mail ballot in the manner provided in the By-Laws. All Fellows, Life Members, Life Fellows, and Members shall be eligible to vote. If more than 10 percent of the eligible voters return properly marked ballots; and if more than two-thirds of such ballots are favorable to the proposed amendment, then the proposal shall be considered adopted

and the Constitution amended accordingly. A date for the counting of the ballots shall be indicated in a memorandum sent out with each ballot; this date shall be not less than 21 nor more than 60 days after the mailing, and all proper ballots received prior to the date of counting shall be tallied.

(21)

4. Proposals to amend the By-Laws shall be received and acted upon in the same manner as proposals to amend the Constitution except that the favorable votes of a majority of eligible voters shall be sufficient to enact the amendment to the By-Laws, provided that not less than 10 percent of the eligible votes shall have been cast in this mail ballot.

BY-LAWS

22

Recommend that serial Arabic numerals be prefixed to the paragraphs of *Article I* of the By-Laws.

23-24

Recommend that *Article IV* of the By-Laws be repealed and the following By-Laws substituted therefor:

AFFILIATED SOCIETIES

(23)

1. When any local, state, district, provincial, territorial, or regional psychiatric society, most of whose members live in the Americas, shall express a desire to become an affiliated society of the American Psychiatric Association, it shall submit to the Council of this Association a copy of its constitution and by-laws, a list of its members, and a certified statement showing its requirements for membership.

(24)

2. If the Council recommends to the Association at an Annual Meeting that the said society be accepted, and if this recommendation be adopted by a vote of the majority of the Fellows and Members voting, then the society making application shall be designated as an affiliated society.

25-28

Recommend that *Article V* of the By-Laws be repealed and the following substituted therefor:

DISTRICT BRANCHES

(25)

1. When a group of not less than 20 of the membership of this Association, residing in a continuous

geographic area, shall make application to the Council of this Association to organize a district branch of this Association and the Council approves, this action shall be presented to the general membership at the next Annual Meeting.

(26)

2. If the establishment of this District Branch is approved by vote of the majority of the Members and Fellows voting on the question, the Branch shall thereupon be considered established and shall be named according to the geographic area of its jurisdiction.

(27)

3. No one shall become a member of a District Branch who is not already of the membership of the American Psychiatric Association.

(28)

4. Each District Branch will elect its own officers, meet its own expenses, adopt its own regulations, and schedule its own programs, provided that nothing is done thereby which is inconsistent with the Constitution, By-Laws, or resolutions of The American Psychiatric Association.

29-34

Recommend the enactment of a new By-Law to be known as *Article VII*, to provide for voting by mail. The proposed text follows:

ARTICLE VII—VOTING BY MAIL

(29)

1. All Members, Fellows, Life Fellows, and Life Members shall be eligible to vote by mail on (a) candidates for office, (b) proposed amendments to the Constitution, (c) proposed amendments to the By-Laws or proposed enactments of new By-Laws,

and (d) matters referred for mail ballot by the Council.

(30)

2. Voting for Candidates. Between February 1 and February 15 of each year, the Secretary shall prepare and mail to each voter an official ballot.

- a. To each voter shall be sent a package containing (1) the official ballot, (2) a letter or memorandum of instruction, (3) an inner envelope, (4) an outer return envelope.

- (1) *The official ballot* shall contain the name of each candidate selected by the Nominating Committee and of each candidate nominated by petition. Candidates for the same office shall be grouped together in alphabetical order. By symbol, word, or phrase, it shall be indicated for each candidate whether he was nominated by petition or by the nominating committee; and the country, state, district, or province of each candidate shall be indicated. The ballots shall be identical, and shall not be numbered, nor shall there be any provision for the signature of the voter. The final return date shall be indicated clearly near the top or near the bottom of the ballot.

- (2) *The memorandum of instruction* shall furnish the key to any symbols or abbreviations in the ballot, shall clearly indicate the final return date of the ballot, and shall give instructions for folding, marking and mailing.

- (3) *The inner envelope* shall have printed on its face a serial number and a certificate which the voter will sign indicating that he is the person to whom the ballot was issued and that this is the only vote he is casting at this election.

- (4) *The outer return envelope* shall be large enough to accommodate the inner envelope. On the face of the outer envelope shall be printed or written the words "Board of Tellers" followed by the office at which the ballots will be counted, so that further addressing by the voter will not be necessary.

- b. Prior to the mailing of the ballots, the President shall designate a Board of Tellers consisting of three persons, at least one of whom shall be a Fellow of this Association, and at least one of whom shall *not* be a Member or Fellow of this Association; and the President shall likewise designate one or two employees of this Association as custodians of the ballots. Record shall be kept of the serial number of the inner envelope mailed to each voter.

- c. As the outer return envelopes are received by mail, the custodian of the ballots shall open the outer envelope and shall compare the signature on the inner envelope and its serial number with the name and number in his record; and if these are found in accord, shall deposit the unopened inner envelope in a safe place. If a discrepancy is found in the name

or number, the inner envelope shall be referred to the Board of Tellers for a decision.

- d. On the day fixed for the counting, the custodian shall open each inner envelope and remove each folded ballot, in the presence of a Teller, and place it, still folded, in a ballot box. And when all inner envelopes have been disposed of, the polls shall be closed and the ballot boxes opened and the votes counted.

- e. Each participant in the counting shall be bound to keep in confidence the results of the election, until the time for the announcement at the Annual Meeting. The announcement shall be made by a person named by the President for this purpose.

(31)

3. *Voting on amendments to the Constitution and By-Laws.*

- a. After a proposed amendment to the Constitution or By-Laws has been circularized or published in the JOURNAL pursuant to Article VIII of the Constitution, the Secretary of the Association shall prepare an official verbatim text of the proposed amendment or the proposed new By-Law, preceded by extracts of the portions of the Constitution and By-Laws that would thereby be amended. Under this text matter, there shall be printed the phrase "Are you in favor of this proposed amendment?" and the words "Yes" and "No" on separate lines with space to indicate the voter's choice. Under these words shall be printed a brief certificate reading "I certify that I am eligible to vote on this proposal and that this is the only ballot I am casting at this referendum" or words to that effect; and under this certificate there shall be space for the voter's signature. Each such document shall be numbered and the Secretary shall transmit to the Tellers a record indicating the person to whom each numbered ballot was sent. The Secretary shall prepare a memorandum of instruction which shall clearly state the return date of the ballot, that being the date on which the votes will be counted. This memorandum, together with a ballot, together with a return envelope addressed to the Board of Tellers, shall be sent to each eligible voter.
- b. The President shall appoint a Board of Tellers consisting of three Fellows who may be assisted by employees of the Association. On the return date of the ballot, the Board of Tellers or any two of them present shall open and count the ballots and certify the results.

(32)

4. *Voting on Referenda.* Whenever the Council, by resolution, direct that a matter be referred to the membership by mail ballot, this shall be done in the same manner as prescribed in Section 3 above. The Council shall, by an enabling resolution, indicate the day of mailing and the return date on which the ballots shall be counted; and there shall

be a period of at least 21 days between these two dates. The Council may likewise, in the wording of its resolution, indicate whether the referendum is to be advisory or binding.

(33)

5. *Effective Dates.* Amendments, new By-Laws, and referenda shall be effective on the date of the certification by the Board of Tellers unless a different effective date is indicated within the text of the proposal.

(34)

6. *Certification.* After the tally of each mail poll, the Tellers shall prepare a written certificate, indi-

cating the number of ballots counted, the number of votes cast affirmatively and negatively and for each candidate, the number of ballots disqualified and the reasons therefore, and the net result of the election. Except in the case of candidates for office, the complete text of this certificate shall be published in the next issue of the JOURNAL. In the case of elections of candidates for office, the full text of this certificate shall be published in the first issue of the JOURNAL to go to press after the Annual Meeting at which the election results have been announced.

KARL MENNINGER, M. D.,
Chairman.

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PRESIDENT'S PAGE

All members of The American Psychiatric Association will want to keep an eye on two important developments which promise to mean a great deal to the mentally ill. One of these has to do with the rating and approval of mental hospitals, and the other with the improvement of state services generally.

Early in July, Dr. M. A. Tarumianz, Dr. Ralph Chambers, and I met with Dr. Malcolm T. MacEachern of the American College of Surgeons of Chicago, to work out an agreement whereby the American Psychiatric Association through its Central Inspection Board would assume full responsibility for nation-wide inspection of mental hospitals.

The American College of Surgeons has provided inspection in the past, but will pass this on to The American Psychiatric Association. The staff of the Central Inspection Board will include in its study such additional data as needed by the American College of Surgeons. The two organizations will clear with each other so that conflicting decisions may be avoided. The current list of approvals by the American College of Surgeons will hold pending the completion by 1952 of the initial surveys. The staff of the Central Inspection Board is being expanded.

On the same day discussions were held with representatives of the American Medical Association looking toward similar arrangements.

The Conference of Governors held in Colorado Springs in June was very much preoccupied with the status of their psychiatric services and particularly the mental hospitals. This culminated in the following resolution: "Mental hygiene and the care and treatment of the mentally ill create some of the most important social and financial problems confronting the states today. In

order that the states may be enabled to deal adequately with these problems, much additional information is needed with respect to personnel, administrative practices, and physical equipment. The Council of State Governments is therefore directed to make a comprehensive, factual study of the activities and facilities of the several states in this field and to submit its report to the Governors of the several states prior to the next annual meeting of the Governors' Conference."

As a first step an advisory committee of 14 persons was asked by Mr. Frank Bane, Executive Director of the Council of State Governments, to meet July 22 and 23, at White Sulphur Springs. The purpose was to help him define the scope of the study, to lay out plans, determine the effective form of a report, the questionnaires to be used, and related matters. Those from The American Psychiatric Association who attended this meeting were: Dr. Samuel W. Hamilton, Dr. Karl A. Menninger, Dr. Ralph M. Chambers, Dr. M. A. Tarumianz, Dr. George S. Stevenson, Dr. Winfred Overholser, Dr. David A. Young, Dr. Riley H. Guthrie, Dr. Ralph Rossen, and Dr. Rudolph B. Toller.

The governors of the states are concerning themselves more with mental health and illness than ever before. It is most hopeful. The procedure of the Council is to have the governor of each state supply the needed data about his state to the research staff. Other accumulations of data are also used as a check. To this end governors will of necessity call upon their commissioners and hospital staffs for the needed facts and opinions. Many members will be drawn into this momentous venture. They will have the opportunity to pass over the governors' desks data which may never have been given attention before.

GEORGE S. STEVENSON, M. D.

COMMENT

SECTION ON HOSPITALS

One hundred six years ago, when the 13 hospital superintendents met and formed what is now the American Psychiatric Association, the hospital point of view was paramount in their minds. Subsequently, however, there were presented multiple ramifications of the field of psychiatry, and the Association grew apace.

The coordinative responsibilities of the hospital as a whole were more or less pushed to one side in favor of developments more specific or detailed and hence perhaps of greater immediate interest to the many psychiatrists exploring the various new potentialities in psychiatry. The need for a Hospital Section that would deal with the integration of all the elements of the hospital came to be neglected in our Association, and the cohesive quality furnished through hospital administration was lost.

Happily, the situation has now been corrected. At the meeting in Montreal, in response to a petition signed by some 250 or more members, the Council created a new Section on Hospitals. This can be looked upon as acknowledgement of the necessity for again emphasizing the problems of administrative psychiatry within the official framework of our Association.

All of the several elements of patient care and treatment that have evolved over the past hundred years most certainly have their place in our specialty, and a tremendously important place it is. However, the very backbone of psychiatry is the hospital as a whole, even as the backbone of any branch of medicine is the hospital as a whole.

It would be difficult to conceive modern surgery, or modern pediatrics, or modern medicine in general, as coming to its fruition, enduring, and advancing, without the general hospital. The general hospital is the workshop of the clinician, the seat of research stimulation and accomplishment, and the terrain upon which the educational structure of medicine is built. The place and function of the psychiatric hospital are of parallel importance.

That a large number of psychiatrists are aware of the importance of hospital problems is evident. The petition signed by the members themselves, together with the hundreds of members at the annual meeting who attended the program on administrative psychiatry, bespeaks a widespread interest in searching out the pressing problems of the hospital as a whole. This interest promises a year-by-year exchange of ideas and experiences that will result in the basic over-all advancement of psychiatry.

The creation of this Section comes at a most happy time, when the Committee on Standards and Policies is aggressive and active, and the Central Inspection Board is a functioning reality. These two factors, with a new Hospital Section, will form a trinity that cannot help but strengthen the basic hospital structure of our specialty. Through these efforts, we may hope to wed the psychiatric hospital system to the general hospital system, from which we have always been too much divorced.

C. C. B.

TRAINING IN MENTAL HOSPITALS

One has heard over and over again from men experienced in psychiatry the remark that no one can really call himself a psychiatrist who has not had some experience in a state hospital or its equivalent. The argument runs:

If people did not get sick there would be no need to find the cause and no need to take measures to prevent the cause. We are members of a profession that owes its very existence to people who are very sick. The state hospital is a city of sick people, from

typhoid fever masquerading as a catatonic stupor to almost pure fantasy living. One does not know pneumonia until he has seen a variety of pneumonias, typical and atypical.

It is a testing ground for the young physician as it draws out the best in him and the worst. It is a place where one can assume as much or as little responsibility for the sick and unfortunate as he wishes. It might help him to know these things early in his career.

There are very few places where a young man can have such freedom of action, clinical and investigative, in an atmosphere where he can do some of his own learning.

One seldom, if ever, sees a good man regret the year or two of experience he has had in a state hospital. Nor is this lack of regret usually due to the material advantages he may or may not have had there such as a good roof over his head and three meals a day for his entire family.

There are other advantages some of which may often be looked upon at first as disadvantages, namely, knowledge of the workings of a great political subdivision of government—a balanced view of the good and the bad in American politics. Recently many will have read in the newspapers or heard from other sources of the wholesale resignation of state hospital doctors in one state because of unhealthy political interference. This spring we read of how one Governor put all his weight behind progressive state hospital legislation and appropriation. This was *healthy* political interference.

The young doctor cannot see mass sickness in a state hospital without being sensitized to the problem of mass health in the communities in which such sickness has developed.

The American Medical Association has approved at least 90 state hospitals in this country for residency training in psychiatry. Some of these hospitals have had recent inspections by the A.M.A. Others will have them in the near future. The A.M.A. hopes to inspect all hospitals with residency training programs in psychiatry by January 1950 in order to check and improve training programs for the protection of present and future trainees.

Quite a number of good residency training programs include a rotation of from 3 months to a year in a nearby state hospital that may or may not be approved in its own right. Such a training affiliation is not only a healthy stimulus to the state hospital, but also a challenge to the resident himself.

We are inclined to believe that a certain Governor is not far wrong when he said that he thought a year in a state hospital for every interne would make better doctors in general. He went on to say if he could get a Supreme Court ruling on its constitutionality he would like to see every interne do it before being granted a full license to practice in his particular state. We doubt if this is possible in a democratic country, or desirable, but the good Governor has a point.

S. S. A.

NEWS AND NOTES

THE DEVEREUX LUNCHEON.—The luncheon meeting arranged as a courtesy gesture by the Devereux Foundation, and which for some years has been a very enjoyable feature of the annual meeting, was especially notable during the recent session of the A.P.A. in Montreal.

The address following the luncheon was given by Dr. William B. Terhune, medical director of the Silver Hill Foundation, New Canaan, Conn., whose topic was "Physiological Psychiatry." In his strong emphasis on the strictly medical aspects of psychiatric investigation and treatment Dr. Terhune made an excellent survey of the field, which was warmly received by the luncheon guests. His paper was discussed by Dr. Selye of Montreal and Dr. Irish of Los Angeles.

Dr. Emile Legrand, professor of psychiatry in the University of Montreal, presided as moderator with characteristic finesse and brought the rather full luncheon program to a close precisely on time.

CLINICAL PROBLEMS OF ADVANCING YEARS.—To mark the opening of their magnificent new research building in Philadelphia the Smith, Kline and French Laboratories arranged a comprehensive symposium on the problems of aging at their laboratories March 16, 1949. More than 600 physicians were in attendance and a panel of distinguished speakers appeared on the program.

In his keynote address, "Medicine Today and Tomorrow," Dr. Edward J. Stieglitz stressed the importance and magnitude of the problems of senescence and of disablement from chronic forms of illness. The wastage in human productivity from these causes is enormous, and the possibility of its reduction is the challenge of geriatrics today. Among the chronic disorders of advancing years psychiatric and neurologic diseases take the lead. Dr. Stieglitz quoted the following figures from the National Health Survey of 1935-36. From a sample of 3 million persons the estimated numbers of cases of total and probably permanent dis-

ability and the disabling conditions were as follows:

	Persons disabled
Mental and nervous disorders.....	269,000
Circulatory disorders	205,100
Joint diseases	147,600
Tuberculosis	77,900
Diabetes mellitus	34,300
Renal disease	31,000
Asthma	29,200
Malignant tumors	28,900

In his concluding remarks Dr. Stieglitz said: "Responsibility for health in later maturity rests first and foremost upon aging individuals themselves. Medical science and practice, medical service schemes no matter how paternalistically conceived and executed can *never give* health to anyone. Health, like esteem, must be earned. This involves self-discipline in living. Health is maintained only by intelligence and effort. Lives rich and full are not fortuitous. But it is the responsibility of medical science and practice to discover the causative facts responsible for premature depreciation and the means of their prevention, and to guide and advise those who want to stay well."

ROCKEFELLER FOUNDATION APPROPRIATIONS 1948.—The interest of the Rockefeller Foundation's Division of Medical Sciences continued in 1948 to be focused on psychiatric and allied sciences. Out of \$14,903,250 total grants by the Foundation, \$1,771,845 went to the medical sciences, and of this amount, \$659,595 was appropriated for the program in psychiatry, neurology, and allied fields.

Dr. Alan Gregg, director of medical sciences for the Foundation, states in introducing his report: "The Foundation encouraged the orientation of medicine in general and psychiatry in particular toward the study of health and normality with grants to Harvard University for studies in personality and in student health, and to the Child Research Council of Denver for research in child development. Grants were made to a group of institutions in the United

States and abroad to support research in various aspects of the basic biology of mental disease. The division allocated funds to two medical schools for general support of their departments of psychiatry, and to Princeton University for research in the psychology of perception. Closely related to the psychiatric program were two grants in genetics, one to the University of Copenhagen for study of the hereditary factors involved in mental defectiveness and the other to Harvard University for a genetic study of the Navaho community at Ramah, New Mexico."

AMERICAN NEUROLOGICAL ASSOCIATION.—At the 74th annual meeting of the American Neurological Association held in Atlantic City, N. J., June 13-15, 1949, the following officers were elected for the year 1949-1950: President, Dr. Henry W. Woltman; First Vice-President, Dr. Johannes M. Nielsen; Second Vice-President, Dr. E. Jefferson Browder; Secretary-Treasurer, Dr. H. Houston Merritt; Assistant Secretary, Dr. Charles Rupp.

NEW MICHAEL REESE HOSPITAL UNIT.—June 29 marked the launching of construction, at a cost of \$1,850,000, of Michael Reese Hospital's new 5-story building with 82 patient beds which will house the Institute for Psychosomatic and Psychiatric Research and Training. This Institute has been functioning since 1946 under the direction of Dr. Roy R. Grinker. During this time the Institute has been without separate building facilities.

For the past quarter of a century psychiatrists and other physicians at Michael Reese have pioneered the concept of the new science of psychiatry as a part of the general hospital. As early as 1922, when the hospital's Mandel Clinic was located on Maxwell Street, Michael Reese became the first hospital in the country to initiate a community psychiatric clinic. In 1937 the hospital made provisions for a full-time psychiatric staff. Two years later in 1939, a 22-bed psychiatric unit within the hospital was created. Since that time the work of the Institute's staff has demonstrated that

disturbed patients can be given the best of medical treatment in the general hospital. Early this year an entire floor for psychiatric service to clinic outpatients was added to the Mandel Clinic.

PSYCHIATRIC FELLOWSHIP AT CEDARS OF LEBANON HOSPITAL.—A 12-month fellowship has been established in the psychiatric department of the Cedars of Lebanon Hospital, Los Angeles, Calif. This will include practical experience in psychotherapy with ambulatory patients, and diagnosis and treatment of psychosomatic disorders of patients hospitalized on the clinic medical and surgical inpatient service, as well as other diagnostic and psychiatric problems which arise in a general hospital with a large outpatient department. The fellowship carries no stipend, but room and board will be provided.

Those interested should apply to Dr. Eugene Ziskind, Director, Psychiatric Clinic, Cedars of Lebanon Hospital, 1306 N. Berendo St., Los Angeles 27, Calif.

SOUTH CAROLINA PSYCHIATRIC SEMINAR.—From Sept. 15 through Sept. 17, 1949, a neuropsychiatric seminar will be held at the Edgewood Sanitarium at Aiken, So. Carolina. The seminar is sponsored by the South Carolina Mental Hygiene Society, the South Carolina Social Hygiene Society, and the South Carolina Junior Chamber of Commerce. It is organized in the interests of the medical profession generally throughout the South, social workers, and interested lay groups from the neighborhood.

Dr. Oren R. Yost, psychiatrist-in-chief of Edgewood Sanitarium, has charge of the proceedings.

RICHARD H. HUTCHINGS MEMORIAL AWARD.—A memorial award of \$100 for an outstanding contribution to psychiatry from a public mental institution has been announced by Dr. Harry A. Steckel, former director of Syracuse Psychopathic Hospital, and head of a committee to honor the late Dr. Richard H. Hutchings, who spent his life in the state hospital field. The award is offered by an anonymous donor and is pre-

sented through Dr. C. Charles Burlingame, psychiatrist-in-chief of the Institute of Living, Hartford, Conn., who is also a member of the Hutchings memorial committee. Scientific articles or nominations for the award may be submitted to Dr. Steckel or to Dr. Newton Bigelow, director of Marcy State Hospital and secretary-treasurer of the committee.

The memorial committee, elected by friends and former colleagues of Dr. Hutchings who have set up a fund in his honor, has the primary purpose of sponsoring a series of annual scientific lectures in memory of Dr. Hutchings, who died in October, 1947. For many years he had been head of Utica State Hospital and had taught psychiatry at Syracuse University College of Medicine. The first of the memorial lectures is expected to be given this autumn, probably at the Syracuse Medical College.

ART AS A PSYCHIATRIC TECHNIQUE.—During the recent annual meeting of the A.P.A. in Montreal, a group of psychiatrists and psychologists discussed the use of "Art Therapy and Diagnosis." A close cooperation and exchange of ideas is planned. Those who are interested in the subject are requested to communicate with Dr. Otto Billig, Department of Psychiatry, Vanderbilt University School of Medicine, Nashville, Tenn.

NURSING CONSULTANT, COMMITTEE ON PSYCHIATRIC NURSING.—Miss Dorothy E. Clark, R. N., B. S., has recently been appointed Nursing Consultant of the Committee on Psychiatric Nursing of the American Psychiatric Association, to succeed Mrs. Lela S. Anderson.

Miss Clark has been Director of Nursing at the New Jersey State Hospital at Grey-stone Park for the past 5½ years.

DR. KISKER TO DIRECT PSYCHOLOGICAL CLINIC, UNIVERSITY OF CINCINNATI.—The Department of Psychology of the University of Cincinnati has announced the appointment of Dr. George W. Kisker as director of the newly established psychological clinic and training center. He will have complete charge of the clinical psychology program at the university and will be responsible for the selection of the clinical staff. He will also supervise the VA, U.S.P.H.S., and state mental hygiene programs, coordinating the various clinical activities with other university, state, federal, and community programs and agencies.

Dr. Kisker has been an associate professor of psychology in the graduate school at the university since 1947 and has served as a psychological consultant to the Department of Medicine and Surgery of the United States Veterans Administration.

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BOOK REVIEWS

THERAPY THROUGH INTERVIEW. By Stanley G. Law, M.D. (New York: McGraw-Hill Book Company, 1948.)

The author was in private practice in a small community. He read some psychiatric literature in order to understand his patients better and became desirous of further psychiatric study. During the war he got this chance and worked with Eric Kent Clarke at Oak Ridge. He now presents to general practitioners his ideas about what psychotherapy is and how they can employ it in their daily work.

The author points out the importance of personality in the physician as well as in the patient. He draws a line between medical work and psychiatric work; in the latter, the physician, instead of giving instructions, draws out the patient's thoughts with a view to getting the patient to make his own decision. The physician must start by taking a very good history, and then must get the patient to take the active rôle in his own treatment. The physician must learn to accept the patient's solution, even if he dislikes it. The physician must also have a good idea as to how far he can go and what cases he will need to refer to a psychiatrist. The physician needs to understand the resistance of the patient and how to bring about acceptance of the doctor and then how their separation comes about.

Five cases are set forth. They are all synthetic, put together from some hundreds that Dr. Law has treated. By this method a good presentation of typical situations is made. The patients do not all come out well; hence the reader will not get an exaggerated idea of ease in treatment. The first is a male hypochondriac. The second is a veteran nursing a huge grudge and accepting the physician only because his job depends on it. The third is a girl with a healthy love affair, clashing with her parents over where she shall go to college. The fourth patient is a beautiful and persuasive psychopathic woman, ingenious and unscrupulous. The fifth is a boy who has been in serious mischief and now has a broken leg. The last case is the most complicated, for a boy has been exposing himself; his mother leads an unhappy frustrated life; the father is sexually unusual; and the little sister is headed toward trouble. In each of these case histories the author stops at appropriate places to discuss some of the issues that he has brought up.

The book is easy to read. The diction is good, in the vernacular, almost chatty in places. It should interest the general practitioner, for whom it was written. It should also be useful to psychiatrists who are disposed through pressure of hospital work—or any other reason—to assume always a dominant rôle with their patients.

SAMUEL W. HAMILTON, M.D.,
Essex County Hospital,
Cedar Grove, N. J.

THE CIBA COLLECTION OF MEDICAL ILLUSTRATIONS.

A compilation of pathological and anatomical paintings. By Frank H. Netter, M.D. (Commissioned and published by Ciba Pharmaceutical Products, Inc., 1948.)

Medical illustration has made tremendous advance since the days of Leonardo and Vesalius and Valverde. The present-day concept of the great value of visual education in the teaching of anatomy, of pathology, and of surgery really began on this continent with the work of the Fabers (Piersol's Anatomy) and, later, with the contributions of Max Brödel of Baltimore. Inspired by their example and, in many cases, by Brödel's personal instruction, and profiting by the development of accurate color printing, succeeding artists have given the student and the practitioner of today examples of medical and anatomic illustration far surpassing anything achieved in the past.

This atlas of medical illustrations by the famous medical artist, Dr. Frank H. Netter of New York, ably maintains and advances the traditions of his noted physician-artist predecessors—Albinus, Scarpa, Bright, Henle, and others. For some years Dr. Netter has been devoting his full time to medical illustration, a field in which his unusual skill, his powers of accurate observation, and his medical background have made him pre-eminently successful. The illustrations in this atlas have been prepared over a period of some 10 years, some of the plates having been made already available in portfolio form. It was because of the continued demand of the profession for these fine illustrations that the Ciba Company finally edited and compiled these portfolios into one volume.

With the illustrations appear selected notes by competent collaborators on the pathology of the condition depicted. A helpful feature is that, accompanying the color plates of the gross specimen and frequently of a microscopic section, is a black and white reproduction of the corresponding X-ray film. This is particularly helpful in the section on the lungs and the one on the gastrointestinal tract.

The atlas is not a complete review of the major conditions which could affect the body, the emphasis being upon the lungs, the gastrointestinal tract, the genital organs, the male and female breast, and the heart. The author's war experience is reflected in his emphasis upon penetrating chest and abdominal wounds and the effects of explosions. To depict all the major internal conditions which could affect the human body would be a monumental task beyond the scope of one artist. However, those who would like to see Dr. Netter turn his gifted brush to the depiction of other systems and other conditions will be pleased to note that the publishers have indicated that a companion volume may be anticipated at a later date.

G. HARVEY AGNEW, M.D.,
Toronto.

DE NEUROSEN. By E. A. D. E. Carp. Third revised edition. (Amsterdam: Scheltema and Holkema, 1947.)

This book, if anything, is even more unorthodox and inconsistent than is Carp's book on medical psychology. His classification of neurotic manifestations is a highly arbitrary one. Most symptoms come under the heading of hysteria and in describing them Carp enters into a great deal of personal evaluation.

He stresses again a deistic viewpoint and tries to define the essence of neurosis as man's failure to realize his mission on earth. A neurotic person is one who is "uprooted" and does not function at his destined place in society. In this respect Carp does not indicate what differentiates a neurosis from a psychosis.

In his attempt to maintain a metaphysical viewpoint Carp rejects the Freudian theory of neurosis as being "animalistic." His contention is that Freud does not distinguish between sex and love. In spite of this theoretical rejection Carp, over and over, uses Freudian thinking in the explanation of neurotic phenomena. While originally defining neurosis as an "existential" deviation, he nevertheless assumes a constitutional disposition underlying certain neurotic disorders. In another instance he also defines neurosis as "an insufficient development of consciousness."

As far as classification of "neurotic reaction forms" is concerned, the author distinguishes between the hysteric, the compulsion-neurotic, and the neurasthenic. Each form somehow is supposed to include the Freudian libidinal types of the erotic, the narcissistic, and the compulsive. Carp attempts to show that the hysteric neurosis is, in the main, a disturbance of emotion, compulsion neurosis a disturbance of thinking, and narcissism a disturbance of volition!

While most manifestations are considered to be hysteric there is so much overlapping in the description of symptoms that they might fit any other "reaction forms" as well. The main goal of psychotherapy is to make the patient accept his "inner self," to lead him to the conviction "that all is good as it is."

ROSE PALM, PH. D.,
N. Y. State Psychiatric Institute,
New York City.

TAKE UP THY BED AND WALK. By David Hinshaw. (New York: C. P. Putnam's Sons, 1948.)

This is essentially the story of rehabilitation at the Institute For The Crippled and Disabled in New York, where a fine and early chapter in the evolving annals of social medicine has been written. A further justification for this book is the need to bring the modern concept of rehabilitation to the man on the street, to popularize the practice

and effectiveness of restoring the severely disabled to economic usefulness and social understanding. After all, the ultimate validity of rehabilitation practice depends upon the individual being served. Scientific techniques have advanced far ahead of the present ability of the public to accept them and the services of rehabilitation have been written more decisively in new methods than in the laws of the land.

The author, a professional writer, discusses rehabilitation as a new concept, its development in the war years, and the new multilateral science which studies the psychosocial adjustment of the disabled. He stresses the vocational affirmation, "The pay check is the pay off." The Institute is referred to as "The School of Another Chance" and repeated mention is made of its treatment of the whole man in terms of human values. Rehabilitation services in the armed forces, the Veterans Administration rehabilitation program, physical medicine's new interest and growth in rehabilitation practice—all these conjoint efforts provide the basis for a new dynamics of restoration, in which the simple concept of activity as an integral part of medicine is assuming major importance.

The book is patchy, the author attempting to compile a great amount of material, factual, psychological, and philosophical, in 262 pages. It attempts to impress the reader by virtue of style and its story, the character of which is indeed dramatic and needs no literary blandishments. The chapter on the Veterans Administration rehabilitation program is incomplete, stressing the legal and administrative setup, primarily, while failing to mention the 5 fingers of the physical medicine rehabilitation service. These include physical therapy, occupational therapy, corrective therapy, education therapy, and manual arts therapy, combining a strong therapeutic team to attack in a most practical and realistic way the problems of rehabilitation and bringing within its focus many so-called chronic and irreversible conditions. But cursory mention is made of the contributions of Howard Rusk, whose leadership in this field is too well known to require further comment.

The promise of the title, "Take Up Thy Bed and Walk," however, is in a large measure realized by the inspirational tenor of this book. The layman will find in it stories of such personalities as Betsy Barton who represent the "miracles in human rehabilitation" and the professional worker will find many helpful pieces of information fitting into the modern ideas and ideals of rehabilitation as a psychosocial process, in which one's desire for physical and spiritual restoration is met by a desire and understanding of the community to accept him; both viewpoints being integrated by the psychiatrist and physiatrist who have discovered modern techniques with which to deal with the emotional as well as physical problems involved.

JOHN EISELE DAVIS, Sc. D.,
Washington, D. C.

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